# SENEGAL ASSESSMENT:
# DRUG MANAGEMENT FOR CHILDHOOD ILLNESS

Jane Briggs
Michael Gabra
Paul Ickx

June 2002

Rational Pharmaceutical Management Plus Program
Management Sciences for Health
4301 North Fairfax Drive, Suite 400
Arlington, VA 22203 USA
Phone: 703-524-6575
Fax: 703-524-7898
E-mail: rpmplus@msh.org

This publication was made possible through support provided by the U.S. Agency for International Development, under the terms of cooperative agreement number HRN-A-00-00-00016-00. The opinions expressed herein are those of the authors and do not necessarily reflect the views of the U.S. Agency for International Development.

**Recommended Citation**

Briggs, Jane, Michael Gabra, and Paul Ickx. June 2002. *Senegal Assessment: Drug Management for Childhood Illness.* Published for the U.S. Agency for International Development by Rational Pharmaceutical Management Plus. Arlington, VA: Management Sciences for Health.

Rational Pharmaceutical Management Plus Program
Management Sciences for Health
4301 North Fairfax Drive, Suite 400
Arlington, VA 22203 USA
Phone: 703-524-6575
Fax: 703-524-7898
E-mail: rpmplus@msh.org

BASICS II Project
1600 Wilson Boulevard, Suite 300
Arlington, VA 22209 USA
Phone: 703-312-6800
Fax: 703-312-6900
E-mail: infoctr@basics.org

# CONTENTS

## List of Tables

# ACKNOWLEDGMENTS

The Drug Management for Childhood Illness (DMCI) study in Senegal was supported with funds from the U.S. Agency for International Development (USAID) Strategic Objective 3 global funding, Africa Bureau, and Senegal Mission. The authors would like to thank particularly the Ministry of Health of Senegal.

A special thanks goes to?

Dr. Ndiouga Diallo, coordinator of the DMCI survey in Senegal;

all the staff of Basic Support for Institutionalizing Child Survival (BASICS) II Senegal and BASICS II West Africa Regional Office;

Prof. Guelaye Sall, Dr. Maimouna Diop-Ly, and Abdoulaye Sambe of the *Division de l'Alimentation et de la Nutrition* (DAN);

Commandant Ngom, *Direction de la Pharmacie et du Médicament*;

Dr. Ndèye Fatou Ndiaye Diaw, *Pharmacie Nationale d'Approvisionnement;*

Diagne Aichatou Diop, *Direction de Soins de Santé Primaire*;

Antoine Ndiaye, Maternal Health and Family Planning project, Management Sciences for Health (MSH), Senegal;

the Regional Medical Officers in Dakar, Fatick, Kaolack, Louga, Thies, and Ziguinchor; and

the District Medical Officers in Guediawaye, Kaffrine, Kebemer, Sokone, Thies, and Ziguinchor.

Finally, the authors would like to extend their gratitude to all the data collectors, to Naisse Djigo for the data entry, and to Alexandra Beith and Michael Derosena of MSH for their assistance and support.

# ACRONYMS

| | |
|---|---|
| AM | antimalarial |
| ARI | acute respiratory infection |
| BASICS | Basic Support for Institutionalizing Child Survival [project] |
| BCG | bacillus Calmette-Guérin |
| BI | Bamako Initiative |
| CaS | *case de santé* (health hut) |
| CFAF | *Communauté Financière Africaine Franc* (unit of currency) |
| CIF | cost, insurance, freight |
| CS | *centre de santé* (health center) |
| DAN | *Division de l'Alimentation et de la Nutrition* |
| DAS | drug availability study |
| DMCI | Drug Management for Childhood Illness |
| DPM | *Direction de la Pharmacie et du Médicament* |
| DPT | diphtheria, pertussis, tetanus |
| DUS | drug use study |
| EDL | essential drugs list |
| ESIS | *Enquête Sénégalaise sur les Indicateurs de Santé* |
| IMCI | Integrated Management of Childhood Illness |
| LNCM | *Laboratoire national de Contrôle de médicaments* (National Control Laboratory for Drugs) |
| MIP | median international price |
| MoH | Ministry of Health |
| MSH | Management Sciences for Health |
| NGO | nongovernmental organization |
| ORS | oral rehydration salts |
| PAHO | Pan American Health Organization |
| PDIS | *Plan de Développement Intégré de la Santé* |
| PHC | primary health care |
| PNA | *Pharmacie Nationale d'Approvisionnement* (central medical stores) |
| PRA | *Pharmacie Régionale d'Approvisionnement* (regional medical stores) |
| PS | *poste de santé* (health post) |
| RPM | Rational Pharmaceutical Management [project] |
| RPM Plus | Rational Pharmaceutical Management Plus [program] |
| STG | standard treatment guideline |
| UNICEF | United Nations Children's Fund |
| USAID | U.S. Agency for International Development |
| WARO | West Africa Regional Office [BASICS II] |
| WHO | World Health Organization |

# EXECUTIVE SUMMARY

Previously, the Management Sciences for Health (MSH) Rational Pharmaceutical Management (RPM) project, in collaboration with the Pan American Health Organization (PAHO), the U.S. Agency for International Development (USAID), and the Basic Support for Institutionalizing Child Survival (BASICS) project, developed an indicator-based tool, the *Drug Management for Childhood Illness (DMCI) Manual*, in response to the need for improving management and use of drugs in the Integrated Management of Childhood Illness (IMCI) strategy. The purpose of the *DMCI Manual* is to assist health managers at the central and district levels identify problem areas in drug management that are critical for ensuring the availability and proper use of drugs and supplies essential to IMCI case management.

The *DMCI Manual* is designed to examine two critical areas of IMCI drug management: availability and use. The availability indicators are used to investigate the state of physical inventory and stocks, record-keeping, and procurement prices. Inventory records are checked and compared with a physical check for a tracer list of drugs and supplies that are considered necessary to treat the five major childhood conditions: acute respiratory infection (ARI), diarrhea, malaria, malnutrition, and measles. Drug use data are collected by reviewing documents and patient records and prescribing patterns of the health worker, as well as by conducting structured interviews and by making simulated purchases in the private sector.

The report of the Senegal assessment of drug management for childhood illness represents a prospective and retrospective assessment of drug availability and use that supports the implementation of IMCI. At the time of the survey (October 2001), IMCI had only been implemented in three districts—Kebemer, Darou Mousty, and Kaffrine—of two regions, Louga and Kaolack. The survey, however, was not limited to districts where IMCI had been implemented. It was of a national scale covering six districts—Guediawaye, Kaffrine, Kebemer, Sokone, Thies, and Ziguinchor—of six regions. The data from the survey yielded strengths and weaknesses of the national pharmaceutical supply system in Senegal. Epi-Info software specifically designed for DMCI was used for data entry and analysis.

The objectives of the Senegal DMCI assessment were as follows:

- Assess the availability (in the public sector) of drug and medical supplies essential for the implementation of the IMCI strategies

- Assess the use patterns of drugs for the key childhood illnesses (ARI [no pneumonia and and pneumonia], diarrhea, and malaria) in both the public and the private sector

- Recommend interventions to improve drug management of childhood illnesses in Senegal

## DMCI Survey Findings

### *Drug Availability*

Only 94 percent of the drugs on the tracer list (a list designed for the survey and used to study drug availability) were on the Senegal essential drugs list (EDL), indicating that at the time of the survey the Senegal IMCI treatment protocols did not follow the national EDL and standard treatment protocols. The study found that the Ministry of Health (MoH) through its central medical stores, the *Pharmacie Nationale d'Approvisionnement* (PNA), purchased the majority of the drugs and supplies in the previous year at prices below—about 90 percent of—the median international procurement price.

In the facilities surveyed, 49 percent of the tracer drugs were available, although this indicator is low because of the findings at *case de santé* (health hut) level, where only 9 of the 34 drugs on the tracer list should be stocked. Availability was highest at the level of the storage facilities (91%, 70%, and 62%) and decreased from there to the more peripheral health facilities. No one drug was available in all facilities, but drugs such as chloroquine, co-trimoxazole, aspririn, and ferrous sulfate were available in more than 70 percent of facilities. Drugs in syrup form were less readily available than the tablet form. There was poor availability of second-line and pre-referral drugs in both stores and health facilities. Across all the facilities, all the tracer drugs were found to be out of stock for about 30 percent of the year. Nearly half (48%) of the inventory records of all tracer drugs in all the surveyed health facilities did not correspond with the physical stock.

Working refrigerators were not found in the majority (62%) of the *postes de santé* (health posts) and in half of the *centres de santé* (health centers), although at storage-facility level only one district depot was found not to have a working refrigerator. Monitoring of refrigerator temperature was carried out in 60 percent of the facilities with working refrigerators. The Ministry of Health, with the assistance of donors, has already purchased new refrigerators, which will be distributed to the facilities in need.

### *Drug Use*

In the districts where IMCI had not yet been introduced, only 75 percent of the *centres de santé* and *postes de santé* had reference materials on treatment guidelines; whereas in the two districts where IMCI had been implemented, all *centres de santé* and *postes de santé* had reference material in the form of the IMCI guidelines. No *cases de santé* or storage facilities had access to reference material on standard drug treatment guidelines.

Of all the prescriptions reviewed involving cases of childhood illness, about half (52%) received an antibiotic. Of the four conditions studied (ARI [no pneumonia and pneumonia], malaria, and diarrhea), cases of pneumonia and malaria were generally treated correctly in the public sector with the appropriate antibiotic (86%) or antimalarial (76%). In the private sector, the majority of malaria cases received an antimalarial (89%), although only 57 percent received the first-line treatment for malaria. Cases of no pneumonia were in general managed better in the districts

where IMCI had been implemented, although this conclusion is not necessarily statistically significant. Overall, 69 percent of cases of no pneumonia received an antibiotic: 30 percent in the two IMCI districts compared with 80 percent in the four districts where IMCI has not yet been implemented. Antibiotics were not excessively used in the private sector; 26 percent of cases of no pneumonia received an antibiotic. Only 60 percent of cases of diarrhea received oral rehydration salts (ORS), a few cases received antidiarrheal drugs (7%), and many cases received antibiotics (64%). This pattern was seen in all districts, regardless of the presence of IMCI. In the private sector, ORS were never sold for a case of diarrhea, because ORS are not classed as a medicine nor licensed to be sold in private pharmacies; about a third of cases received an antibiotic (26%) or an antidiarrheal (37%).

These results suggest a need to re-educate or resensitize the health and pharmacy workers on the use and management of antibiotics and to improve their diagnostic skills. The most obvious danger that could result from the irrational practices noted is the development of antimicrobial resistance to the most commonly used antibiotics in child health, such as co-trimoxazole and amoxicillin.

These irrational treatment practices are reflected in the comparison of cost of actual treatments encountered in the survey to the cost of the standard treatments in the IMCI guidelines. On average, children were given treatments costing more than three times (306%) the standard IMCI treatment. This difference was greater (360%), in general, in the districts where IMCI has not yet been implemented, compared with the two IMCI districts (163%), although this comparison is not necessarily statistically significant. Children with ARI (no pneumonia) and diarrhea tended to receive more costly treatments than the standard IMCI treatments (563% and 302%, respectively), which is mostly attributable to irrational prescription of antibiotics or cough-cold remedies. During the course of the survey, a wide variation in the prices of drugs sold in the public sector was also encountered. The nonadherence to IMCI protocols is costly for the national supply system and for out-of-pocket expenditures of the caretakers. Significant cost savings can be achieved if protocols are adhered to.

From exit interviews, it was discovered that many (68%) patients received the drugs that they were prescribed at the health facility. It is, however, a common practice, for a variety of reasons, for some patients to buy the drugs that were prescribed at a private pharmacy after the visit to the health facility. Despite the fact that most (86%) caregivers were given instructions on administration of the prescribed drug during their consultation, only 59 percent could describe how to administer the drugs correctly as they left the health facility. This finding was particularly worrying for those receiving antimalarials (none able to describe correctly) and antibiotics (37% able to describe correctly) because of the consequences of developing drug resistance as well as managing the sick child.

IMCI training in case management emphasizes the need for the health worker to ask a number of critical questions about the severity of the disease, which is also good clinical practice. During consultation in the public facilities, it was found that few (21%) health care workers evaluated the severity of the illness of the sick child, except in the two districts where IMCI has been implemented, where it was done routinely (87%). In the private sector, about a quarter (21%) of sick children were assessed for severity. Only 43 percent of the health workers in the public

sector provided information to caregivers on signs of progressive illness and recommended that the patient visit a medical officer or a clinic if the symptoms reappeared, and no staff in retail drug outlets told caretakers about signs of progressive illness. Nutritional advice also was given in less than half of cases (41%) in the public sector and to none in the private sector.

## Conclusions

The DMCI survey has identified some strong and weak points in the drug management of childhood illnesses in Senegal. Procurement of drugs is generally efficient, with prices lower than the median international price. Insufficient communication among different sectors of the MoH impedes the harmonization of guidelines and drugs lists, which in turn affects procurement of drugs and hence their ultimate availability in the health facilities. Weaknesses exist in ensuring drug availability, especially at the periphery, and capacity needs to be strengthened in supply chain management, in areas such as inventory and stores management, quantification, and logistics management information systems.

Although cases of pneumonia and malaria tend to be managed appropriately, the cost savings to the system of efficient procurement are eroded by the irrational prescribing habits and use of drugs by health workers. The inappropriate use of antibiotics for ARI (no pneumonia) and simple diarrhea is a particular problem and could increase development of resistance to important and inexpensive antimicrobial drugs.

## Recommendations

The assessment study team has proposed a number of recommendations to strengthen the weaker points identified in the drug management of childhood illnesses in Senegal.

1. Ensure coordination, collaboration, and communication between IMCI and drug departments of the MoH at national level, to ensure coherent policies.

2. Review at central level the anticipated role of the *case de santé* and assess its functionality.

3. At central level, use evidence-based criteria and a systematic process to update the EDL to ensure that the most cost-effective drugs are used in the system.

4. At central level, but involving peripheral-level staff, review the EDL by facility level, especially for the *case de santé*, to ensure that the appropriate IMCI drugs are included at the appropriate levels, in line with the guidelines.

5. Study the suppliers and quantities of drugs purchased for those drugs where the procurement price was more than the median international price. Review the tender process accordingly.

6. Continue to monitor quality of drugs.

7. Integrate drug management training into the IMCI training plan. This training should be coordinated between the *Division de l'Alimentation et de la Nutrition* and the *Direction de la Pharmacie et du Médicament*, as well as other partners interested in drug management, and should be targeted to all the different categories of health workers at *centres de santé* and *postes de santé* as well as the community-based health workers in the *cases de santé.*

8. Ensure simple store management tools such as reporting forms and stock cards are available at all levels for use in storage facilities as well as health facilities.

9. Improve links between health facilities and stores. Better coordination and communication of stock availability and consumptions patterns is needed.

10. At central, regional, and district level, reassess the role of the regional stores to determine its cost-effectiveness and to ensure that it is not just another bottleneck in the distribution chain.

11. Disseminate the national standard treatment guidelines and the Senegal IMCI treatment protocols to all health facilities and storage facilities.

12. At central level, review the prices of the public sector and establish a system to control the margins applied between facilities.

13. Expand IMCI as a form of rational drug use training, targeting the different categories of health workers at the *centres de santé* and including community-based health workers at *case de santé* level.

14. At central level, develop and introduce easy-to-read drug management and rational drug use visual aids, flow charts, and posters in all health facilities.

15. At central level, redesign patient registers to facilitate completion with all necessary information including drug dosing.

16. At central level, advocate and encourage the use of key IMCI essential drugs, such as ORS or the first-line antimalarial in the private sector. This encouragement could take the form of reduced tax on purchase or some other incentive.

17. At district level, work with health workers, district health teams, and specialists in information, education, and communication to develop guidelines on drug dispensing and effective communication of information about drug administration to caregivers.

A strategy-planning workshop with all the concerned stakeholders and partners was held in May 2002 to discuss the assessment results and, using the recommendations, to develop next steps and interventions. The MoH and other partners will use the action plans resulting from that workshop

in their planning process to ensure that strategies are implemented to improve the drug management of childhood illnesses in Senegal.

# INTRODUCTION TO THE DMCI METHODOLOGY

## Integrated Management of Childhood Illness

The World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) collaborated to develop the Integrated Management of Childhood Illness (IMCI) strategy, which aims to reduce global mortality and morbidity for the leading causes of childhood illness—

- Acute respiratory infection (ARI)
- Diarrhea
- Malaria
- Malnutrition
- Measles

The IMCI strategy helps health workers diagnose these conditions, provide standard treatments and follow-up, and promote preventive measures. Each country that chooses to implement an IMCI program adapts the treatments and guidelines to the local setting to ensure that the most effective and cost-efficient treatment for each diagnosis is available. The necessary precondition to IMCI success is the availability of drugs and supplies.

A 1996 indicator-based study conducted in three Central Asian Republics by the Rational Pharmaceutical Management (RPM) project found that drugs and medical supplies essential to proper implementation of IMCI strategies were not readily available in government health facilities and that treatment costs were higher as a result when IMCI protocols were not used. With that finding in mind, the Drug Management for Childhood Illness (DMCI) assessment tool was developed by RPM in collaboration with the Pan American Health Organization (PAHO), the U.S. Agency for International Development (USAID), and the USAID-funded Basic Support for Institutionalizing Child Survival (BASICS) project. DMCI complements the IMCI strategy by assessing the availability and use of drugs for childhood illnesses, which are critical for implementing IMCI, helping plan and monitor implementation of IMCI, and improving IMCI drug management. DMCI uses a comprehensive rapid assessment methodology with three components—

- Assessment manual
- Data collector's guide
- DMCI software program based on Epi-Info

The DMCI methodology is based on 20 indicators to evaluate the drug management cycle, as defined by Management Sciences for Health (MSH) (1997), focusing in particular on drug availability and use (Annex 1). The reference manual also includes four supplemental indicators that are optional. Combined, the indicators describe the degree to which drug availability and use affect IMCI implementation in the country being studied. The data collected are entered into an Epi-Info-based software program specifically designed for DMCI.

As a result of two applications of the DMCI tool in Ecuador and Bolivia in 1998, RPM further revised the DMCI. In November 1999 a workshop was held in Dar es Salaam, Tanzania, to present the latest version of the DMCI. The meeting included stakeholders from Tanzania, Uganda, and Zambia and representatives of several bilateral and multilateral organizations, including the WHO headquarters and Africa regional offices, the World Bank, and UNICEF. As a result of this meeting, the tool was revised and the new version was used for the DMCI assessments that followed in Zambia (1999) and Uganda (2000).

Following the success of the assessments in East and Central Africa, and spurred by stakeholders' interest in introducing the DMCI tool in West Africa, the DMCI tool (manual, data collector's guide, and software) was translated into French. In September 2001, a subregional workshop was held in Dakar, Senegal, to introduce the tool to key actors from Ministries of Health (MoHs)and nongovernmental organization (NGOs) working in child health and the pharmaceutical sector of selected countries of West Africa (Guinea, Mali, Niger, and Senegal) and Haiti. All of the participants recognized that the DMCI could be useful in their own countries and settings and proposed applications in the future.

This report presents the results and background of the application of the DMCI survey tool in Senegal. The Senegal DMCI assessment was conducted during September–October 2001. The data were reviewed by a local survey coordinator, entered into the DMCI Epi-Info software in Dakar, and analyzed by the Rational Pharmaceutical Management Plus (RPM Plus) program staff in Arlington, Virginia, United States.

# BACKGROUND

## Health Situation in Senegal

The total population of Senegal, West Africa, was estimated to be 9, 421,000 in 2000 (WHO 2001), with a density of approximately 47 persons per square kilometer (ESIS 1999). The population is growing at a rate of 2.4 percent (World Bank 2001).

In comparison with other sub-Saharan African countries, Senegal does not rank at the bottom of the list, but as can be seen from the data in Table 1, the country still has some health problems that need targeting. All recent statistics in Senegal are difficult to obtain with any degree of certainty, because transmission of data from the periphery to central level had been suspended for several years. That situation has recently been resolved.

### Table 1. Key Health Indicators

| Health Indicators | Senegal | Sub-Saharan Africa |
|---|---|---|
| Life expectancy at birth (years) | 52.5 (in 2000)[a] | 51[b] |
| Infant mortality (per 1,000 live births) | 63 (in 1998)[c] | 104[b] |
| Under-five mortality (per 1,000 live births) | 118 (in 1999)[d] | 169[b] |
| Maternal mortality (per 100,000 live births) | 510[e] | 975[b] |
| Total fertility rate | 5.3[f] | 5.5[b] |
| HIV prevalence (15–49 years old) | 1.4% (1996)[g] | 8.8%[h] |

[a] *Source*: World Bank 2000.
[b] World Bank 2001.
[c] WHO 1999.
[d] UNICEF 2001.
[e] WHO Basic Health Indicators 1994–1997.
[f] WHO 2001.
[g] Guimier and Candau 2001.
[h] Page 5 in USAID/WHO. December 2000. "Regional HIV/AIDS Statistics and Features, end of 2000." Joint United Nations Programme on HIV/AIDS (UNAIDS). UNAIDS/00.44E–WHO/CDS/EDC/2000.9. Geneva: WHO.

Child mortality in Senegal has fallen over the last three or four decades from 295 per 1,000 live births in 1955–1959 to 130 in 1995–1999, with a decrease of 30–34 percent between 1980 and 1999 (WHO 2000a; WHO 2000b). Although child mortality was estimated in 1999 to be 118 per 1,000 live births (UNICEF 2001), which is lower than for Sub-Saharan Africa, a regional variation exists in child mortality, with the highest mortality being seen in the poorer regions, such as Kaolack.

It was estimated in 1990 that 54 percent of the population of Senegal was in absolute poverty (WHO 1999).

Vaccination coverage was estimated in the *Enquête Sénégalaise sur les Indicateurs de Santé* (ESIS; Senegalese Survey on Health Indicators) (ESIS 1999) as follows:

| | |
|---|---|
| Bacillus Calmette-Guérin (BCG; tuberculosis vaccine) | 82 percent of one-year-old children fully immunized |
| Diptheria, pertussis, tetanus (DPT) 3 | 43 percent of one-year-old children fully immunized |
| Polio 3 | 50 percent of one-year-old children fully immunized |
| Measles | 46 percent of one-year-old children fully immunized |

The overall coverage of fully vaccinated children was 42 percent, but this percentage varies greatly between urban and rural areas (Guimier and Candau 2001).

Although recent mortality data is hard to obtain, the ESIS (1999) gives an idea of the prevalence of some major childhood illnesses. Of children under five years, 21 percent were found to have had diarrhea in the two weeks preceding the survey. It was estimated that each five-year-old child would have had several episodes of diarrhea, prevalence again being greater in rural areas such as Kaolack (ESIS 1999). Of children under five years, 45 percent were found to have had fever (presumed to be malaria in Senegal) during the two weeks prior to the survey (ESIS 1999). Each child is estimated to develop 1.5 to 3 episodes of malaria per year, and malaria is estimated to be responsible for 25 percent of deaths of children age six months to five years.

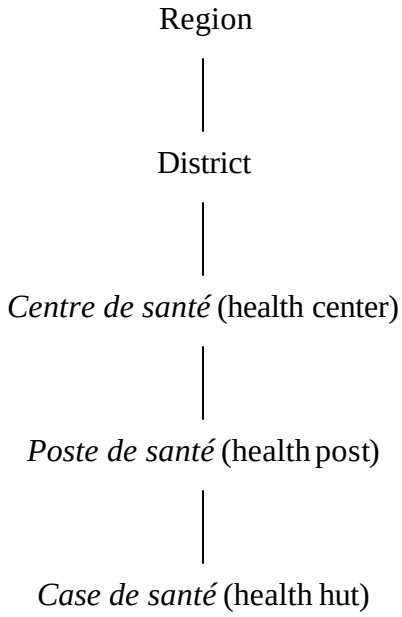
## Health System in Senegal

The health system in Senegal is decentralized into regions and further decentralized into districts. The districts have autonomy to take decisions and are allocated money from the MoH to spend at district level. They manage their own generated resources autonomously. The activities of a health district or health region fall under the control of the District or Regional Medical Officer. There are 10 health regions in the country, each with at least one regional hospital (four are in Dakar) and these 10 regions comprise 45 health districts. The population of a health district is on average 150,000 to 300,000 people and contains one *centre de santé* (CS; health center) and 15 to 30 *postes de santé* (PS; health post) attached to a CS. A more peripheral clinical structure, which is not operational in all districts, is the *case de santé* (CaS; health hut), which is run by a volunteer community health worker and attached to a *poste de santé*. The *cases de santé* do not figure on the health map, and it is unclear how many are operational at district level.

In 1999 (ESIS 1999), it was estimated that a *poste de santé* covered a population of 11,500 inhabitants and a *centre de santé* covered a population of 175,000 inhabitants. In total, there were 52 *centres de santé* in 1993 (Ickx et al. 1995) among the 45 districts, some districts having more than one *centre de santé*. There are 683 *postes de santé* (Ickx et al. 1995); each one is attached to a *centre de santé*, in theory for supervision and the provision of drugs. From the 2001 health map, it has been estimated that about 77 percent of the population is within five kilometers from

a public health facility (*poste* or *centre de santé*) and that 94 percent is less than 10 kilometers from a public health facility (Guimier and Candau 2001).

The health system can be depicted as follows:




The World Health Report (WHO 2001) notes that Senegal's total expenditure on health in 1998 was 4.5 percent of the gross domestic product, divided almost equally between public and private expenditure. Public expenditure on health represented 13 percent of the total government expenditure in 1998.

The Bamako Initiative (BI) of cost recovery was introduced in 1992, although even before then, Senegal had introduced a successful system of cost recovery. The Swiss Cooperation provided a donation of drug kits to establish a drug revolving fund and initiate the BI. With the advent of the BI, health associations and health committees were given legal status.

## Drug Management System in Senegal

### *Ministry of Health*

The Ministry of Health aims to ensure financial and geographic accessibility of the population to drugs, targeting availability and rational use in both the public and private sectors. Several bodies within the MoH work together to implement this policy.

The *Direction de la Pharmacie et du Médicament* (DPM) is the department of the MoH that administers and regulates the pharmaceutical sector. The DPM implements regulations and laws to guarantee the quality, safety, and efficacy of all pharmaceutical and medical products produced or imported into Senegal. Its responsibilities include authorizing drug products for the private market (drug registration), registering private pharmacies and depots, inspecting pharmacies, and controlling prices of drugs in the private sector. It has a similar role in the public sector. There are eight pharmacists in the DPM and four inspectors to cover both public and private sectors, although two more are currently being trained in Morocco.

Registering drug products requires that the importer submit an application for a "visa" to the DPM. This application should contain the name of the company; a complete description of the product; and a sample of the product, which is sent for quality control (although not all drugs are systematically quality controlled [Guimier and Candau 2001]), together with a registration fee of CFAF 250,000 (US$358[1]) for a "visa" that is valid for five years.

Quality of products is the responsibility of the *Laboratoire national de Contrôle de médicaments* (LNCM; National Control Laboratory for Drugs), which has recently been rehabilitated and equipped, but it is still not functioning to full capacity. In theory, the LNCM should control the quality of all drugs applying for a "visa," although this system is not yet operational. Systematic sampling of each batch imported by the *Pharmacie Nationale d'Approvisionnement* (PNA) is also being put in place.

In theory, the DPM revises and issues the essential drugs list (EDL) and the standard treatment guidelines (STGs) of Senegal every two years, after collaborative development by a commission. The essential drugs list is revised in response to requests from doctors for additions of drugs, which are then considered by the commission. The first EDL was issued in 1990, and later revised in 1994 and again in 1997. The most recent edition was published in 2001. After the initiation of the Bamako Initiative, the MoH, in collaboration with UNICEF, developed some treatment protocols (*ordinogrammes*) for use at the *postes de santé* to encourage correct diagnosis and appropriate treatment. To date, these *ordinogrammes* have been limited only to the *poste de santé* level, and there are no national STGs for *centres de santé* or hospitals.

Registration of pharmacists is carried out by the national association (*Ordre National des Pharmaciens*), which is headed by a board of elected members and a government-nominated magistrate. Each pharmacist must register each year. There are 600–700 pharmacists in Senegal.

### *Drug Supply and Distribution*

The majority (85–90%) of drugs in Senegal are imported. Importation is primarily from France and is carried out by both public and private importers. Imported products are exempted from customs and VAT (value-added tax). There are three manufacturers in Senegal: SIPOA is local and Aventis and Parke-Davis are international. SIPOA sells most of its products to the Senegalese market, and Parke-Davis sells up to 40 percent of its production on the local Senegalese market and exports the remainder. Of the products manufactured locally, generic

[1] Exchange rate: CFAF 700 = US$1 on average (May 2002).

products under generic name account for only 5 percent of business. Total local production represents about 10 percent of the products on the private sector. In total, 2,500 pharmaceutical products are registered to be marketed in Senegal.

The total value of the drug market in Senegal in 1999 was CFAF 58 billion (approximately US$83 million) (Guimier and Candau 2001). Households directly finance 91 percent of this expense, mostly through the private sector (CFAF 46.3 billion) and partly through the public sector (CFAF 6 billion) (Guimier and Candau 2001). In addition to the BI cost recovery that exists at the public health–facility level, the MoH allocates a budget to each district for drugs to cover the indigent population. Data from the *Plan de Développement Intégré de la Santé* (PDIS 2000) shows that within each region less was spent on drugs than was received.

### *Public Sector*

Distribution of drugs in the public sector is conducted through the PNA. The PNA is an autonomous state institution that has financial and managerial autonomy, although the capital comes from the state, which also appoints the director of the PNA. The majority (80–90%) of drugs required are purchased through international tender every two years. Delivery of drugs after the tender takes approximately six months. Recently, in order to improve the quality of drugs, the PNA has centered its purchases on European countries, which in 1999 represented 75 percent of the sources of drugs (22% came from France, 54% from other European countries); 16 percent were manufactured locally in Senegal and 8 percent came from other countries (Guimier and Candau 2001, citing 1999 PNA figures). The assessment of needs for the order is quantified on the basis of drug consumption information from the PNA, the regional stores, and the regional hospitals. The public supply system is pyramidal in nature: the central PNA supplies drugs to a network of five regional stores (*Pharmacie Regionale d'Approvisionnement* [PRA]), which in turn supply the district depots (*dépôts de district*), which then provide drugs to the health facilities, which supply drugs to the population under a system of cost recovery or the BI. The PNA and the PRA have computerized stock-control systems. Drugs in this distribution system are primarily generic, which are on the national EDL. About 600 products are stocked in the PNA, of which about 350 are drugs. As well as providing the drugs for the public sector, the PNA also supplies drugs to the army and police hospitals as well as to NGOs and church institutions on authorization from the DPM. Drugs are sent to the PRAs from the PNA approximately every month on receipt of a requisition, and transport is provided by the PNA. The district depots order their drugs from the PRA as they need them; there is no schedule for these orders, nor is transport provided. Equally, this method applies to the clinical health structures, which order their drugs from the district depot, usually found in the compound of the *centre de santé.* The stores managers of most of the district depots were trained at the start of the BI in issues of financial management, but not in stores management.

Drugs are purchased from the district depots by the *centres de santé* and *postes de santé*, but the *cases de santé* purchase drugs from the *postes de santé.* All drugs are sold to patients at the facility under the BI. Exceptions are vaccines, which are supplied to patients essentially free of charge, with a minimal fee to cover the vaccination card; family planning commodities, which in general are provided at a fee of CFAF 300; and drugs for tuberculosis, which are provided free in

some facilities but at a charge in others. For the sale of drugs in the public sector, no levels are fixed for the margins to be added to the cost price of drugs. Thus, each health facility is left to fix its own prices, which in some cases can be higher than in the private sector. When the BI started, fixed price margins were instituted, but these were revised some years later because it was noted that health facilities were applying their own different margins. In 1994, the MoH issued a *circulaire* stating the markups at each level of facility: the *dépôt de district* was allowed a 5 percent margin on the PNA prices, and the health facilities could apply up to a 50 percent margin on PNA prices. Since then, although this *ciruculaire* remains as guidance, there is no control of these price margins, and health facilities, in fact, charge a range of prices.

### *Private Sector*

The private sector represents 85 percent of the value of the sale of drugs in Senegal (Guimier and Candau 2001). Distribution of drugs in the private sector is through three wholesalers (Cophase, Laborex, and Sodipharm) acting as importers as well as wholesalers, with 80–90 percent of drugs imported and the remainder manufactured locally. These wholesalers provide drugs to a nationwide network of 532 pharmacies (*officines de pharmacie privées*) and about 100 pharmacy depots or small-scale wholesalers (*dépôts pharmaceutiques privés*), of which the majority (306 or 60%) are located in Dakar. Most private pharmacies are in an urban setting; 75 percent are concentrated in the eight towns with populations of more than 100,000, which represent only 38 percent of the total population of Senegal (Guimier and Candau 2001). Wholesalers can supply pharmacies several times a day, depending on proximity, and they provide transport of drugs to pharmacies within Dakar. The prices in the private sector are controlled so that a drug is sold at the same price throughout the whole country. A fixed markup is added to the CIF[2] price of the drug to calculate the wholesale price. Then, a further, controlled markup is applied at pharmacy level. There are three types of markups:

1. The lowest is for drugs serving a desired public health goal, such as antimalarials, antihypertensives, and the like.

2. A medium markup applies to regular drugs.

3. A greater markup is used for hospital-level drugs.

No pharmacy can alter the selling prices because they are marked on the packaging of the drug container.

Drugs in Senegal are divided into three groups.

Group A: Poisonous drugs require a prescription, which cannot be repeated. This group includes antibiotics, halofantrine, psychotropics, and sulfadoxine/pyrimethamine. Packages in this class are marked with a red, single-lined box. A margin of CFAF 40 is added to the selling price at pharmacy level.

[2] CIF (cost, insurance, and freight) prices includes transport charges up to the point of entry.

Group B: Controlled drugs/drugs of abuse, for example, morphine. These drugs can only be purchased by pharmacies from the PNA with authorization from the DPM. The quantity of the prescription should be written in words and be for no more than a month. The prescription is never repeatable. Packaging for drugs in this class is marked with a red, double-lined box.

Group C: Toxic drugs issued on a prescription, but a single prescription can be refilled without so stating on the prescription—for example, antihypertensives, amodiaquine, and insulin. Packaging for drugs in this class is marked with a green, single-lined box. A margin of CFAF 30 is added to the selling price.

Additionally, "hors classe" (outside of a class) or "simple" drugs can be sold without prescription, but under supervision of a pharmacist—for example, chloroquine, aspirin, and paracetamol.

According to law, no drugs can be sold outside of a pharmacy and all sales must be supervised by a pharmacist.

### *Illicit Market*

A third, important sector exists in Senegal for the supply and distribution of drugs. This illicit sector takes different forms, among others—

- The traditional sector and mobile sellers
- The Touba and Keur Serigne Bi sectors, which are organized parallel systems offering wholesale and retail drug outlet services

The prices in this sector tend to be up to 30 percent lower than the private sector; however, the quality of products is variable, with 33 percent of samples found to be placebos in a study (Guimier and Candau 2001).

## Applying the DMCI Tool in Senegal

The IMCI regional adviser of BASICS West Africa Regional Office (WARO) attended the regional workshop on DMCI in Tanzania because there was interest in applying the DMCI tool in Francophone Africa through BASICS WARO. Translation of the DMCI manual, data collector's guide, and software into French ensued. During September 2001, a subregional workshop to introduce the DMCI concept and assessment tool to five Francophone countries (Guinea, Haiti, Mali, Niger, and Senegal) was held in Dakar, Senegal. Participants included key persons involved in IMCI and the pharmaceutical sector from MoHs and NGOs in those countries.

The *Division de l'Alimentation et de la Nutrition* (DAN) of the MoH, which coordinates all IMCI activities in Senegal, was very interested in conducting a DMCI assessment in Senegal as a baseline before expanding IMCI into more districts during 2002. At the time of the survey, IMCI was applied in only 3 of the 45 districts in the country. Preparation for the assessment took place through discussions among BASICS, the MoH, and RPM Plus staff. Key members of the DAN as well as staff from BASICS participated in the regional workshop, which allowed them to become familiar with the DMCI tool and survey methodology.

The objectives of the Senegal DMCI assessment were as follows:

- Assess the availability (in the public sector) of drugs and medical supplies essential for the implementation of the IMCI strategies
- Assess the patterns of use for drugs used to treat the key childhood illnesses (diarrhea, malaria, pneumonia, and ARI no pneumonia) in both the public and the private sector
- Recommend interventions to improve drug management of childhood illnesses in Senegal

# METHODOLOGY

## Study Design

The DMCI tool is designed to assess two drug management outcomes—availability and appropriate use—affecting the implementation of IMCI in four different public and private settings:

- Central level
- Regional and district levels
- Health facilities
- Private retail drug outlets

The DMCI study was designed to answer certain questions about drug availability and use, as described in the following sections.

### *Drug Availability*

The drug availability indicators allow investigators and key decision-makers at the central and regional levels to identify the factors related to low availability of drugs and medical supplies, as well as opportunities for improving the supply system. These indicators will be used to guide efforts in planning interventions to ensure that drugs and medical supplies are available in the public and private sectors. The drug availability indicators attempt to answer the following questions:

1. Are the drugs and medical supplies required to treat children under five years of age available in public health facilities?

2. If they are not available in the public-sector facilities, are they available and affordable (based on average prices) in the private sector?

3. What are the determinants of product availability in the public sector (that is, the performance of the system)?

For the Senegal assessment, the drug availability study (DAS) assessed the availability of a set of tracer drugs and medical supplies (including vaccines) needed to treat children as outpatients for five IMCI conditions. In an ideal scenario, the availability of these drugs and medical supplies would have been assessed before introducing the IMCI concept in the country. The data collection techniques for the drug availability study included document review, structured interviews, and physical inventory checks.

### *Drug Use*

The purpose of the drug use study (DUS) is to review prescribing practices for IMCI health problems and assess their clinical and cost implications. The DUS targeted MoH facilities and drug retail outlets and used two methods of data collection: retrospective collection through records review and prospective collection through observation, exit interviews, and simulated purchases. The retrospective component of the prescribing study looked at patient records in the facilities for cases of acute respiratory infections, malaria, and diarrhea, whereas the prospective component covered all five IMCI conditions. The drug use indicators attempt to answer the following questions:

1. What are the current prescribing practices for the five major childhood illnesses?

2. Are the current prescribing practices clinically appropriate?

3. How does the actual drug cost of current practices for treating IMCI health problems compare to what the estimated cost would be if IMCI treatment guidelines were followed?

## DMCI Indicators

The DMCI is an indicator-based tool that measures performance of a particular aspect of the IMCI drug supply system. RPM and its collaborators designed a set of 20 indicators to review and analyze the drug management aspects of implementing IMCI programs. The 20 indicators are divided into 7 drug availability indicators and 13 drug use indicators, which are listed here and can also be found in Annex 1.

### *Drug Availability Indicators*

1. Percentage of DMCI tracer drug products on the Essential Drugs List

2. Percentage of the median international price paid for a set of DMCI tracer drugs that were part of the last regular MoH procurement

3. Average percentage of a set of unexpired DMCI tracer drugs available in MoH storage and health facilities

4. Average percentage of time out-of-stock for a set of DMCI tracer drugs in MoH storage and health facilities

5. Average percentage of stock records that correspond with physical counts for a set of DMCI tracer drugs in MoH storage and health facilities

6. Percentage of MoH storage and health facilities visited that have a working refrigerator with freezing compartment and thermometer for vaccine storage

7. Percentage of MoH storage and health facilities with up-to-date monitoring records for refrigerator temperature

### *Drug Use Indicators*

Thirteen indicators describe drug use practices for IMCI health problems and assess their appropriateness and cost implications. For the Senegal assessment, ARI was subdivided into the categories of pneumonia and no pneumonia (cough and cold).

8. Percentage of MoH health facilities visited with an official manual of treatment guidelines for childhood illnesses, based on WHO IMCI treatment guidelines

9. Percentage of encounters diagnosed as no pneumonia (cough or cold) that were prescribed antibiotics

10. Percentage of encounters diagnosed as pneumonia that were prescribed appropriate antibiotics according to treatment guidelines

11. Percentage of encounters diagnosed as diarrhea that were prescribed oral rehydration salts (ORS)

12. Percentage of encounters diagnosed as diarrhea that were prescribed antidiarrheals

13. Percentage of encounters diagnosed as nondysentery/noncholera diarrhea that were prescribed antibiotics

14. Percentage of encounters diagnosed as malaria that were prescribed an appropriate oral antimalarial, according to treatment guidelines

15. Average cost of drugs prescribed as a percentage of costs if IMCI norms for treatment were followed

16. Percentage of prescribed drugs actually dispensed

17. Percentage of caregivers who could correctly describe how to give the prescribed medication

18. Percentage of encounters where health workers asked one or more clinical questions from IMCI guidelines to determine severity of health problem

19. Percentage of health workers who provided basic information to caregivers on how to give the recommended drugs

20. Percentage of health workers who told caregivers about any signs of progressive illness and recommended a visit to the doctor or clinic if the signs appear

## Data Collection

### *Preparation Phase*

A local coordinator familiar with drug management oversaw the entire DMCI process (training, data collection, and data entry).

During the preparatory phase, the coordinator managed the partnership of stakeholders, chairing preparation meetings with the MoH, BASICS II, and RPM Plus. An intensive preparation phase with the DMCI working group was conducted for three days (September 17–19, 2001) to adapt the data collection forms to the local context, to prepare for the training of the data collectors, and to carry out team-building among the trainers. The adaptation process ensured that the terminology used in the data collection forms was appropriate to the Senegalese situation, that the definitions were appropriate, and that the appropriate criteria of observation were selected. This crucial part of the preparation ensures that the data produced by the study are of use to the stakeholders and local planners. The members of the DMCI working group are listed in Annex 2.

#### *Tracer List Development*

A major part of the preparation was to reach consensus on the tracer list to be used for the survey. The list is an integral part of the DAS. The tracer list is intended to comprise key drugs, vaccines, and other supplies essential for the management of childhood illnesses. A model list is included in the *DMCI Manual*, but adaptation to country context is imperative. The working group in Senegal selected a mixture of first-line oral drugs as well as some second-line or pre-referral drugs, according to the IMCI guidelines. The strength of these drugs was selected on the basis of what was commonly available, and, where appropriate, syrups were selected as well as tablets, because the former are a more appropriate dosing form for children under five years old. The tracer list consists of 34 commodities, of which 4 are vaccines, 4 are supplies, and the remaining 26 are drugs used in child health. The tracer list is in Annex 3.

#### *Classification of Illness*

Another important step in the preparation for the survey is the classification of illness. This classification is required during the retrospective drug use data collection from patient records. The DMCI working group classified illnesses using local terminology for the symptoms or diagnosis that fell into each category. The team discussed the terms used to describe the different conditions or symptoms and developed a standard list to be used for each facility under the survey. The list used for the survey is in Annex 4.

## *Data Collectors*

The DMCI coordinator managed the selection and training of the data collectors. The data collectors were selected according to the functions required for the various data collection techniques: checking drug inventory, reviewing patient records, observing consultations, performing exit interviews, and making simulated purchases. The DMCI working group felt that a variety of profiles was required in a team of data collectors to enable them to carry out the required tasks. The suggested profiles were—

- Clinician (doctor or nurse)
- Pharmacist
- Good communicator with a minimal health background (such as social workers, community health agents)

Four data collectors were required for each district team and, because six districts were selected to be surveyed, 24 data collectors were needed. Data collectors were recruited in two phases. First, to ensure local participation and to stimulate involvement in the survey, the regional medical officers were contacted and asked to volunteer staff to be data collectors. This phase yielded most of the data collectors required. After studying the suggested candidates and identifying the profiles that were missing, persons in Dakar with the required profiles were recruited. A total of 26 persons were recruited for training, establishing a reserve that would allow replacement of any potential candidates considered substandard while retaining a sufficient number. However, after the training, all of the data collectors were retained, as all were of an adequate standard for data collection tasks. Some of the data collectors who were recruited directly were not available for the whole two weeks of data collection, thus the extra two data collectors ensured sufficient staffing for the entire period of the survey. A list of data collectors showing their division into teams and the team leaders is in Annex 2.

### *Training of Data Collectors*

The training of the data collectors took place September 20–25, 2001. From within the DMCI working group, members who had attended the subregional DMCI introductory workshop were identified as trainers. These trainers participated in some preparation as a group in order to examine and adapt the training materials, to allocate responsibilities, and to prepare individual training sessions. The trainers are also listed in Annex 2.

The training of the data collectors was opened by Dr. Mandiaye Loum, Director of Health. During the five days of training, the purpose of the DMCI survey was explained and descriptive key health indicators and other relevant information were summarized and discussed. Each of the data collection techniques was presented together with the data collection forms; role-play and exercises were used to practice the techniques. Problems were resolved in plenary discussions. The observation skills of the data collectors were tested using a reliability test, and those with the highest scores were chosen to be observers in the survey to ensure quality data collection.

Table 2 summarizes the data collection methods used for the Senegal DMCI assessment, which were practiced during the training.

Data collectors also conducted a one-day practical session in Dakar, visiting several urban *centres de santé* and retail outlets, which promoted an understanding of the potential obstacles and organization needed to complete the data collection. Lessons learned from the practical session were used to complement the training. At the end of the training each team of data collectors prepared a schedule to complete the data collection in its assigned district and was given all the necessary survey materials. The program of the training sessions is in Annex 5.

**Table 2. Data Collection Techniques for Senegal DMCI Assessment**

| Study | Data Collection Technique | Public-Sector MoH Facilities | Private-Sector Pharmacies |
|---|---|---|---|
| **Drug Availability** | Document review | X | |
| | Structured interview | X | |
| | Physical inventory | X | |
| **Drug Use** | Patient medical records review | X | |
| | Direct observation | X | |
| | Exit poll interviews | X | |
| | Simulated purchase (with no prescription) | | X |

### *Team Leader/Managers Concept*

The data collectors were grouped into four data collection teams. One person from each team was designated as team leader responsible for supervising the team, coordinating the data collection exercise in the field, overseeing data collection, checking the data, and maintaining communications with the DMCI coordinator. The team leader was also responsible for introducing the team at each health facility and explaining the purpose of the visit. A team-building session was held with the team leaders before the survey started, to clarify roles and define responsibilities.

Before data collectors departed for the study sites, arrangements were made for them to contact the coordinators for any assistance or clarification and advice that they might need while in the field. Most of the team leaders had cellular phones, and in areas with no access to cell communications, landline telephone contact could be used.

## *Logistics*

All the regional medical officers, except one, provided transport for each of the data collection teams for use during the survey in the respective regions. The fuel and per diem for the driver was covered by RPM Plus.

The Ministry of Health provided letters of authorization for the data collectors to facilitate the survey process.

Some data collectors were not working in their home regions. The cost of their lodging and meals was covered by RPM Plus.

### *Data Collection*

The data collectors conducted the data collection over a two-week period from September 28 to October 12, 2001. The six teams of four data collectors were allocated their data collection sites, which had been selected according to the criteria described in the next section. The coordinator of the DMCI survey made several supervisory visits to each district during this time to monitor the data collection.

## Site Selection and Sample Size

The *DMCI Manual* provides a detailed discussion on the selection process of sites for the DMCI survey. In Senegal, attempts were made to include facilities representing all variants of the overall system.

The DMCI working group elected to survey all six regions where USAID and BASICS II intervene. Within each region, 1 district was chosen based on geographical, socioeconomic, and population density factors, and to a lesser degree on the level of IMCI implementation, to produce a sample of 6 districts representative of the 45 districts of the country.

Following the selection of the sites, the DMCI coordinator and the central-level Ministry of Health contacted each of the Regional and District Medical Officers to seek their approval to participate in the assessment. The districts chosen for the survey are shown in Table 3.

**Table 3. Characteristics of the Sample Districts**

| Region | Regional Population | District | Characteristics |
|---|---|---|---|
| Dakar | 2,326,929 | Guediawaye | Urban area; capital city |
| Fatick | 628,968 | Sokone | Rural; poor geographic accessibility |
| Kaolack | 1,100,939 | Kaffrine | Semiurban; IMCI implemented |
| Louga | 555,052 | Kebemer | Rural; IMCI implemented |
| Thies | 1,310,933 | Thies | Urban area; noncapital city |
| Ziguinchor | 534,887 | Ziguinchor | Semiurban; border area |

The number of facilities in and the population served by the districts are shown in Table 4. The figures (obtained from DPM) for the number of facilities, although not totally current, give a guide as to the approximate size of the districts and the health services provided.

**Table 4. Population and Facilities of the Districts**

| District | Population | Centres de Santé | Postes de Santé | Cases de Santé |
|---|---|---|---|---|
| Guediawaye | 452,168 | 1 | 11 | 0 |
| Sokone | 99,791 | 1 | 15 | 54 |
| Kaffrine | 338,719 | 1 | 18 | 98 |
| Kebemer | 101,052 | 1 | 11 | 27 |
| Thies | 420,684 | 1 | 47 | 45 |
| Ziguinchor | 283,118 | 1 | 19 | Unknown |

### *Health Facilities*

The sample size for the study was 30 clinical facilities, 5 from each of the selected districts. Health facility selection was based on the DMCI guidelines. The Senegal equivalent to a district hospital (the *centre de santé* or health center) was selected for each district. Three *postes de santé* (*postes de santé* are the Senegalese equivalent to a health center in other African settings) were randomly selected in each district. The more peripheral *case de santé* is "attached" to a *poste de santé* for logistic, reporting, and supervisory purposes, but there is inconsistent functionality of the *cases de santé* and not every *poste de santé* has an "attached" *case*. Two *cases de santé* were selected for each *poste de santé* depending on their functionality.

Storage facilities were also surveyed for the DAS. The central medical stores (PNA) and three regional medical stores (PRA) were surveyed. Not all regions have medical stores; there are only five regional stores for 10 regions, thus a sample of three covers more than half. Each district has a district store (*dépôt de district*), so the district store was surveyed in each of the districts selected.

The desired sample for each of the six districts was the following:

1 *dépôt de district* (district store)
1 *centre de santé* (health center)
3 *postes de santé* (health post)
6 *cases de santé* (health huts)

Table 5 illustrates the types of facilities that were surveyed and shows the number of each facility intended to be surveyed as well as the actual number surveyed. These two numbers were different only for the *cases de santé*, because in some districts not enough *cases de santé* were operational.

**Table 5. Types of Facilities**

| Facility Type | Number to Be Surveyed | Number Actually Surveyed | Type of Services Provided | Staffing |
|---|---|---|---|---|
| Case de santé | 36 | 17 | Outpatient consultations | Community health worker |
| Poste de santé | 18 | 18 | Outpatient consultations, vaccinations, prenatal consultations/family planning (and delivery) | Nurse & other support staff (sometimes a midwife); community health workers |
| Centre de santé | 6 | 6 | Outpatient consultations, inpatient services, laboratory, vaccination, maternity and prenatal care services | Doctors, midwives, nurses & other support staff |
| Dépôt de district | 6 | 6 | Storage & distribution | Attached to *centre de santé* |
| PRA | 3 | 3 | Storage & distribution | |
| PNA | 1 | 1 | Storage & distribution | |
| **Total** | **70** | **51** | | |

### *Retail Drug Outlets*

The DUS portion of the DMCI assessment included a survey of retail drug outlets. According to the DPM, there are at least 532 retail pharmacies and 100 private pharmacy depots in Senegal. Of these, 60 percent are located in the capital, Dakar. For the purposes of the DUS in Senegal, a sample of five retail outlets per district (30 in total) was aimed for, although only 28 were actually surveyed. These outlets were selected by convenience, choosing, where possible, one retail outlet close to a surveyed public facility.

### *Patient Encounter Samples*

A sample of 600 patient records per IMCI health problem studied are required for the retrospective portion of the DMCI assessment DUS. The rationale for this sample size is based on the following assumption: The study design is intended to estimate percentage indicators that summarize values for the whole sample with a 95 percent confidence interval, plus or minus 7.5 percent error (Keene et al. 2000)

For statistical computation reasons, the sample size required for this assumption should total a minimum of 600 medical records for each IMCI health problem—2,400 records for all four conditions. According to the *DMCI Manual* (Keene et al. 2000), this total is usually achieved by randomly selecting 30 medical records for each IMCI problem in 20 health facilities. However, because in this survey six districts were used, with 10 facilities per district, the sample was larger. Not as many *cases de santé* as expected were surveyed because they were not all functional, and those that were functional were not expected to have good patient records. The data collectors had problems collecting enough cases of pneumonia in many of the facilities. The

actual number of records for all four disease states was 2,737, and the distribution among levels of facility by disease is shown in Table 6.

**Table 6. Distribution of Prescriptions Reviewed**

| Facility Type | Pneumonia | No Pneumonia | Malaria | Diarrhea | Total |
|---|---|---|---|---|---|
| Case de santé | 0 | 51 | 256 | 124 | **431** |
| Poste de santé | 176 | 465 | 570 | 459 | **1,670** |
| Centre de santé | 130 | 152 | 184 | 170 | **636** |
| **Total** | **306** | **668** | **1,010** | **753** | **2,737** |

Although experience has shown that the results of collecting larger samples are not more useful for identifying the main problems, it was the wish of BASICS II and USAID to survey all six regions where USAID intervenes.

### *Simulated Purchases*

Simulated purchases were conducted to assess dispensing in private pharmacies. Pharmacy owners and personnel are often suspicious of assessment activities. Therefore, the data collectors played the role of a caregiver of a sick child, as realistically as possible, preferably using local languages so as not to bias the response of the vendor, especially in rural areas. The case to be used was predefined and standardized across all survey sites and the request and information provided were limited to a few predefined points.

## Data Processing and Analysis

It was intended that the data entry person participate in the first few days of training for the data collectors; however, due to problems finding a potential candidate who was available five or six days per week for usual working hours, this was not possible in Senegal. Intensive training of the data entry person and the DMCI coordinator was undertaken by Paul Ickx during the first few days of the survey using data gathered during the practical session of the data collectors training to practice. Problems were discussed and addressed to ensure reliable entry of the survey data.

The coordinator reviewed each form for any corrections, data cleaning, or clarifications needed before its input into the software program. The questionnaire and forms were coded by geographic site and entered into the DMCI software program based on EPI-Info (version 6.04) by the local data entry person, backstopped from the United States by Paul Ickx of BASICS II and Jane Briggs of RPM Plus. The process of data entry and quality checking continued until December 20, 2001. RPM Plus staff in Arlington, Virginia, analyzed the data.

# INTERPRETATION OF FINDINGS

## Description of the Sample

Between September 28, 2001, and October 12, 2001, 51 public drug storage and health facilities were visited and investigated for the availability of a list of IMCI tracer drugs. The storage facilities included PNA, three PRA, and six district pharmacies. In the health facilities, availability as well as prescription behavior for four IMCI conditions (no pneumonia and pneumonia ARI, simple diarrhea, and uncomplicated malaria) was investigated. The health facilities included six *centres de santé*, 18 *postes de santé*, and 17 *cases de santé. Cases de santé* were surveyed only in Sokone (5), Kebemer (6), Ziguinchor (3), and Kaffrine (3) districts; none were found operational in the districts of Thies or Guediawaye. In addition, in 28 private pharmacies, a simulated purchase exercise was performed for malaria. In 27 of these, the same exercise was performed for diarrhea and no pneumonia ARI.

A total of 3,115 cases were investigated, of which 82 were fictitious cases used in the simulated purchase exercise. Of the remaining 3,033 real cases, 2,737 were extracted from patient records (retrospective) and 296 were actually observed during consultation (prospective). Of the 3,033 real cases, 439 were found in a CaS; 1,887 in a PS; and 707 in a CS.

A total of 8,057 drugs were prescribed.

Drug availability, drug management, and prescription indicators were calculated on the total sample and subsamples. The total sample allows making statistically valid (with a confidence interval of 95% ± 7.5%) conclusions for the availability indicators. The CS and PS combined subsample allows the same for the prescription indicators. Further subsamples (for example IMCI and non-IMCI districts) are given as illustration. These subsamples in certain cases are too small to compare and make statistically valid conclusions, but serve to illustrate possible trends.

The complete set of indicators with results is presented as a table in Annex 6.

## Drug Availability Study

### *Indicator 1. Percentage of DMCI tracer drug products on the essential drugs list*

The WHO IMCI model treatment guidelines have been used to develop a standard list of drugs that should be available locally to treat the most common childhood illnesses. This indicator is a measure of the ability of the national pharmaceutical system to support IMCI.

The DMCI tracer list used in Senegal was developed in collaboration with the key experts in the MoH. The tracer list is a compilation of the drugs included in the standard treatment guidelines for IMCI in Senegal. There are 34 products on the DMCI tracer list (26 drugs, 4 vaccines, and 4 supply items; see Annex 3 for the complete list). Of the 34 drugs on the tracer list, 94 percent (32) were also on the EDL of Senegal. Neither nalidixic acid nor iron/folic acid syrup were on

the EDL, but both are in the national IMCI guidelines. Iron/folic acid in tablet form, however, is on the EDL drugs list, but it is not in the IMCI guidelines because the syrup form is more appropriate to give to children.

All procurement of drugs in the public sector is conducted according to the EDL. Thus, for an IMCI drug to be available in the health system, it needs to be on the EDL.

### *Indicator 2. Percentage of median international price paid for a set of DMCI tracer drugs that were part of the last regular MoH procurement*

This indicator is calculated by comparing the most recent MoH acquisition price, which was from 2001, for a set of tracer drugs to the median international procurement price. The median international price (MIP) was obtained from the *International Drug Price Indicator Guide* published by MSH in 2000 (McFadyen 2000).

Procurement of drugs for the public health system in Senegal is managed by the PNA. International open tenders are made every two years, which provide 80–90 percent of the requirements of the country. Smaller emergency purchases are made through closed tenders when required. In 2001, the PNA paid on average 90 percent of the MIP for the set of tracer drugs. This indicator shows that the PNA is procuring efficiently, in general. The system of international open tender is effective in keeping the prices close to the median international price.

Of the 34 products listed, 12 (35%) were purchased at price above the MIP (see Table 7), the highest prices being for aspirin and diazepam. The remaining 22 products (65%) were purchased at equal to or under the MIP.

**Table 7. Drugs Purchased above the MIP at the Time of the Study**

| Name | Strength | Form | Percent above the MIP |
|---|---|---|---|
| Diazepam | 5mg/ml | Injection | 100.00 |
| Aspirin | 500mg | Tablet | 78.26 |
| Metronidazole | 50mg/ml | Syrup | 32.50 |
| Tetracycline | 250mg | Tablet | 20.83 |
| Iron/folic acid | 200/0.25mg | Tablet | 19.05 |
| Co-trimoxazole | 48mg/ml | Syrup | 18.42 |
| Mebendazole | 100mg | Tablet | 13.04 |
| ORS | 27.9g | sachet | 10.87 |
| Nalidixic Acid | 250mg | Tablet | 10.16 |
| Quinine | 100mg/ml | Injection | 8.78 |
| Paracetamol | 500mg | Tablet | 7.14 |
| Chloroquine | 10mg/ml | Syrup | 4.76 |

There are some fast-moving drugs on the list with prices higher than the median price; procuring these in large quantities can be a source of overspending for the MoH. Drugs such as aspirin

500mg tablets (178%) and ORS sachets (110%) fall into this category. Lesser-used drugs such as diazepam injection (200%) and metronidazole injection (132%) are highly priced, and a different source of these drugs should be sought. The drugs are sometimes purchased from several sources at different prices, which may be a contributing factor to an inflated price; concentrating the order with one selected supplier at the lowest price may reduce the overall price. "Emergency procurement" of some items may be the source of higher prices. It is not known whether the higher-priced drugs were purchased locally or internationally.

It is important to note that this assessment did not study the quality of products. Although the procurement success of achieving lower-priced products is recognized, it is essential for drug products to be of good quality. India is a source of many products used in Senegal, and while many Indian manufacturers meet high standards, India is also known for delivery of products of questionable quality. It is recommended that the PNA should continue to monitor the quality of purchased drugs.

### *Indicator 3. Average percentage of a set of unexpired DMCI tracer drugs available in MoH storage and health facilities*

This indicator measures the availability of the DMCI tracer list at the time of the study. In the best conditions, all drugs should be available at all times. In the survey, an average of 49 percent of tracer drugs was found in stock in government facilities at the time of the study. Almost half the tracer drugs were absent in more than half of the visited facilities. Two drugs (nalidixic acid and iron/folic acid suspension) on the list, despite being on the IMCI guidelines, were never available in any facility because they had neither been part of the procurement by PNA nor entered the distribution system from another source. This factor contributes to a low overall result, but is not the sole reason. A separate analysis run without those two drugs, which had never been in the system, generates a very similar value for availability (52%).

In an accessibility study carried out in 2001, which did not focus only on child health, availability was found to be about 64 percent. This difference may be caused by the different tracer drugs used in that study (Guimier and Candau 2001).

A classic pattern of decreasing availability with increasing distance from the center of the distribution system is noted, with availability being highest in the PNA and lowest in the *cases de santé* as shown in Table 8. This analysis was conducted using the 34 tracer drugs as the denominator. In fact, the desirable situation is the reverse: lowest availability at central level of storage and highest at peripheral levels, where patients are treated. Overall, the best availability is seen in the stores; 91 percent at central level, and a slightly better availability (70%) at district stores than at the regional store (62%) because vaccines are not stocked at the PRA. A much poorer picture of availability is seen at the *centre de sante* (59%) and *poste de santé* (58%) levels, which should stock all the drugs of the tracer list. Availability in the peripheral units depends on the distribution from the PNA to the districts and from the district to the peripheral units. Comparing these figures to figures from a survey in 1995 (Ickx et al. 1995), demonstrates that although the availability at central (PNA; 77% in 1995) and district store level (59% in 1995) has improved, there is little difference at facility level (59% in 1995), and the availability at regional level has actually deteriorated (95% in 1995).

**Table 8. Stock Availability**

| Facility Type | All | | | IMCI Districts | | Non-IMCI Districts | |
|---|---|---|---|---|---|---|---|
| | Number of Facilities | Average % of Tracer List Available | Average % of 32 Drugs Available | Number of Facilities | Average % Available | Number of Facilities | Average % Available |
| Case de santé | 17 | **24**[a] | 25 | 8 | 22 | 9 | 24 |
| Poste de santé | 18 | **58** | 62 | 3 | 60 | 15 | 58 |
| Centre de santé | 6 | **59** | 63 | 2 | 63 | 4 | 59 |
| Dépôt de district | 6 | **70** | 74 | 2 | 68 | 4 | 71 |
| PRA | 3 | **62**[b] | 66 | 1 | 65 | 2 | 60 |
| PNA | 1 | **91** | 97 | | | 1 | 91 |
| **Overall** | **51** | **49** | **52** | **16** | **44** | **35** | **52** |

[a] This value is for all 34 drugs. If the list of 9 drugs to be used at the CaS level is used instead, the indicator increases to 58 percent.
[b] This value is lower than the district stores because vaccines are not stocked at the PRA. Excluding the vaccines, this indicator increases to 70 percent (the same as for the district stores).

Each level of health facility has a list of drugs that should be stocked at such a facility. The list for the *postes de santé* and the *centres de santé* contains all the tracer items (except for two items that are not included for the PS: chloramphenicol injection and gentian violet), but the peripheral *case de santé* facilities have an even more limited list of nine items. (The tiered EDLs are shown in Annex 7.) If the availability of the *cases de santé* is recalculated taking into consideration the nine drugs intended to be stocked there, the availability improves to an order similar to those of the CS and PS (58%). In theory, it should be easier to manage a store with fewer drugs and to ensure their availability.

When a comparison was made between IMCI and non-ICMI districts, little difference was noted in the availability of drugs across all facilities. If the average is calculated with only clinics and no storage facilities, the clinics in the non-IMCI districts had 44 percent of the drugs available at the time of the survey compared with 40 percent in IMCI districts. This result is expected because the IMCI intervention included no training on drug supply management.

The findings in Table 9 show that the availability of vital first-line drugs is good in the stores and the health facilities, ranging from 100 percent to 82 percent for chloroquine tablets and from 83 percent to 80 percent for co-trimoxazole tablets; however, the pediatric syrup form of these drugs is less available than the adult tablet form. Some other first-line drugs, which could be considered less vital, are available only in just over half of the health care facilities (e.g., paracetamol syrup 58%, tetracycline eye ointment 63%) but available in most (90% and 100%, respectively) of the stores. Some second-line and pre-referral drugs seem to be less available in the health care facilities (hydrocortisone injection available in 100% of stores, but only 8% of facilities), which suggests a problem of distribution from the stores to the facilities. Insufficient quantities may have been ordered by the peripheral level, or the drug may not be considered to be used and therefore not stocked. Some of the results suggest that some drugs were not part of

**Table 9. Availability of Tracer Drugs for All Facilities**

| Tracer List | % Availability in Stores | % Availability in CS & PS | % Availability in CaS for All 34 Drugs | % Availability in CaS for 9 Drugs |
|---|---|---|---|---|
| Amoxicillin syrup 250mg/5ml | 100 | 79 | 12 | |
| Amoxicillin 500mg tablet | 90 | 71 | 12 | |
| Aspirin 500mg tablet | 90 | 75 | 71 | 71 |
| Balance | 40 | 46 | 65 | 65 |
| Chloramphenicol 1g/vial | 50 | 29 | 0 | |
| Chloroquine 50mg/5 ml syrup | 90 | 67 | 35 | 35 |
| Chloroquine 150mg tablet | 100 | 96 | 82 | 82 |
| Co-trimoxazole 240mg/5ml syrup | 80 | 54 | 12 | |
| Co-trimoxazole 480mg tablet | 80 | 83 | 47 | |
| Diazepam injection 5mg/ml | 100 | 71 | 6 | |
| Ferrous/folate syrup 200/0.25mg/ml | 0 | 0 | 0 | |
| Ferrous sulfate/folic acid tablet 200/0.25mg | 90 | 92 | 82 | 82 |
| Gentian violet paint 25 grams | 30 | 13 | 18 | |
| Hydrocortisone injection 20mg/ml | 100 | 8 | 0 | |
| IV-giving set | 100 | 67 | 0 | |
| Mebendazole 100mg tablet | 100 | 92 | 76 | 76 |
| Metronidazole 250mg tablet | 90 | 88 | 29 | |
| Metronidazole 250mg/5ml syrup | 50 | 42 | 12 | |
| Nalidixic acid 500mg tablet | 0 | 0 | 0 | |
| Oral rehydration salts | 90 | 75 | 41 | 41 |
| Paracetamol 120mg/5ml syrup | 90 | 58 | 35 | |
| Paracetamol 500mg tablet | 10 | 29 | 29 | |
| Quinine 100mg/ml injection | 100 | 88 | 6 | |
| Salbutamol 0.5mg/ml injection | 20 | 8 | 0 | |
| Sodium chloride 500ml | 90 | 67 | 0 | |
| Syringes + needle | 100 | 92 | 29 | |
| Tetracycline 250mg tablet | 90 | 63 | 18 | |
| Tetracycline eye ointment 1% | 100 | 63 | 47 | 47 |
| Thermometer pack/piece | 90 | 38 | 24 | 24 |
| Vitamin A 100,000IU tablet | 30 | 50 | 24 | |

the normal MoH procurement because they are in poor supply at the stores level (e.g., chloramphenicol injection in 50% of stores, gentian violet in 30% of stores, salbutamol injection 20%, and vitamin A 30%). Their absence at storage level accounts for their absence at the peripheral level (e.g., chloramphenicol injection available in 29% of facilities, gentian violet in 13%, and salbutamol in 8%). This situation could be caused by a central procurement problem or the fact that some drugs, which are available in small quantities at PNA level, are not distributed to the PRA or district stores for further distribution in the periphery. However, all other drugs

were in stock at the time of study in the storage facilities and therefore the impediments to their availability at peripheral level are likely untimely ordering or poor quantification.

From column 4 of Table 9, it can be seen that although only a limited list of nine drugs (which does not include any antibiotics) is supposed to be stocked and used at *case de santé* level, in fact, many more drugs are stocked (e.g., co-trimoxazole). The survey did not investigate the sources of such drugs.

The availability of vaccines, as shown in Table 10, is low. The overall average, however, is reduced by the absence of vaccines in the CaS, where vaccination does not take place, and the regional stores, which are not part of the distribution chain for vaccines. The availability at central and district stores is 100 percent, but at the CS and PS the availability is about 70 percent. A two-week stock should be kept at *centre de santé* and *poste de santé* level, which the results do not reflect. Reportedly, the common practice is to obtain vaccines just before vaccination day in the *postes de santé.*

**Table 10. Vaccine Availability for All Facilities**

| Vaccine Type | Average % Available | % Availability in PNA | % Availability in PRA | % Availability in Depot | % Availability in CS & PS | % Availability in CaS |
|---|---|---|---|---|---|---|
| BCG 10 dose/amp | 43 | 100 | 0 | 100 | 63 | 0 |
| DPT 20 dose/amp | 51 | 100 | 0 | 100 | 79 | 0 |
| Measles 20 dose/amp | 47 | 100 | 0 | 86 | 75 | 0 |
| Polio | 45 | 100 | 0 | 100 | 67 | 0 |

### *Indicator 4. Average percentage of time out-of-stock for a set of DMCI tracer drugs in MoH storage and health facilities*

A complementary indicator of availability is a measure of stock-outs during a period of time. Together with Indicator 3, this indicator allows for a more robust analysis of the stock situation over time and adds to the physical inventory conducted for Indicator 3. In contrast to Indicator 3, which looks at a specific moment in time, Indicator 4 provides a measure of a procurement and distribution system's capacity to maintain a constant supply of drugs. For the DMCI tracer drugs, the target time out-of-stock should be 0 percent, or no stock-outs. The information for this indicator was gathered, where possible, from the stock cards. Where there were no stock cards, all other sources of information were used, such as tally sheets at the dispensing unit, invoices from the stores, and the like.

Overall, drugs were out-of-stock 43 percent of the time over the previous 12 months. This figure appears high (compared to 24% in Zambia and 32% in Uganda) and seems not to guarantee ready access to drugs for the population, although it is an inflated result due to the inclusion of the CaS level. The high figure for the *case de santé* should be recalculated for the nine drugs to be stocked at that level, which results in 34 percent of days the drugs were out-of-stock. Thus, taking an average across the three facility levels, CS, PS, and CaS have average stock-outs of

just over 30 percent of the time for the tracer drugs that should be in stock at that level (adjusted for the restricted list of CaS). As with Indicator 3, the shortest time of stock-out is seen at central level (17%) and the longest in the peripheral health facilities (see Table 11). These results are similar to the results of the 1995 survey (Ickx et al. 1995).

Although the sample is not of a statistically significant size, IMCI districts (50%) suffered a longer period of stock-out of drugs compared to non-IMCI districts (39%). However, when the value is recalculated removing the effect of the stores, the length of stock-out for the clinics in the IMCI districts was 55 percent compared with 49 percent for non-IMCI districts. This difference is minimal, although studying the *centre de santé* alone, a shorter period out-of-stock was observed in the IMCI districts. However, no statistically significant conclusions can be drawn from these results.

**Table 11. Average Percentage of Days Drugs Were Out-of-Stock (O/S)**

| | All | | | IMCI Districts | | Non-IMCI Districts | |
|---|---|---|---|---|---|---|---|
| **Facility Type** | **Number of Facilities** | **Average % of Days O/S** | **Average % of Days O/S for 32 Drugs[a]** | **Number of Facilities** | **% of Days O/S** | **Number of Facilities** | **% of Days O/S** |
| Case de santé | 17 | **70**[b] | 68 | 8 | 76 | 9 | 62 |
| Poste de santé | 18 | **34** | 31 | 3 | 32 | 15 | 35 |
| Centre de santé | 6 | **36** | 33 | 2 | 27 | 4 | 41 |
| Dépôt de district | 6 | **19** | 14 | 2 | 22 | 4 | 18 |
| PRA | 3 | **21** | 18 | 1 | 28 | 2 | 18 |
| PNA | 1 | **17** | 12 | | | 1 | 17 |
| **Overall** | **51** | **43** | **40** | **16** | **50** | **35** | **39** |

[a] As described for Indicator 3, separate analysis without nalidixic acid and iron/folic acid suspension.
[b] This value is for all 34 tracer drugs. If the indicator is recalculated using only 9 drugs, the result is 34 percent.

The results of this indicator for each drug are shown in Table 12. At stores level, a similar profile is seen as with Indicator 3, with the same drugs having a long period of being out-of-stock. Longer periods of stock-outs are seen with the second-line and pre-referral drugs. Drugs are a source of income for the facility, and the data collection team noted anecdotally that the drugs that are sold the most are monitored more closely and stock-outs are avoided for those drugs.

These findings indicate that stock levels are not constant over time in any of the facilities surveyed. The longest period of stock-out was found at the most peripheral facilities (which are intended to be the first point of contact for patients) and the shortest at the central stores. CS, PS, and CaS which, in general, most patients visit first, had the expected drugs in stock for about 70 percent of the year for a group of tracer drugs.

**Table 12. Percentage of Days Out-of-Stock (O/S) for a Set of DMCI Tracer Drugs**

| DMCI Tracer Drug List | % Days O/S in Stores | % Days O/S in CS & PS | % Days O/S in CaS (for all 34 drugs) | % Days O/S in CaS (for 9 drugs) |
|---|---|---|---|---|
| Amoxicillin syrup 250mg/5ml | 1 | 19 | 86 | |
| Amoxicillin 500mg tablet | 0 | 29 | 84 | |
| Aspirin 500mg tablet | 0 | 12 | 20 | 20 |
| Balance | 44 | 49 | 45 | 45 |
| Chloramphenicol 1g/vial | 37 | 49 | 90 | |
| Chloroquine 50mg/5 ml syrup | 0 | 26 | 57 | 57 |
| Chloroquine 150mg tablet | 0 | 10 | 6 | 6 |
| Co-trimoxazole 240mg/5ml | 5 | 32 | 80 | |
| Co-trimoxazole 480mg tablet | 0 | 14 | 48 | |
| Diazepam injection 5mg/ml | 7 | 36 | 84 | |
| Ferrous/folate syrup 200/0.25mg/ml | 80 | 82 | 100 | |
| Ferrous sulfate/folic acid tablet 200/0.25mg | 0 | 11 | 19 | 19 |
| Gentian violet paint, 25 grams | 70 | 72 | 72 | |
| Hydrocortisone injection 20mg/ml | 71 | 80 | 90 | |
| IV-giving set | 1 | 17 | 90 | |
| Mebendazole 100mg tablet | 2 | 19 | 12 | 12 |
| Metronidazole 250mg tablet | 1 | 17 | 61 | |
| Metronidazole 250mg/5ml syrup | 13 | 37 | 84 | |
| Nalidixic acid 500mg tablet | 80 | 83 | 100 | |
| Oral rehydration salts | 6 | 18 | 44 | 44 |
| Paracetamol 120mg/5ml syrup | 0 | 25 | 75 | |
| Paracetamol 500mg tablet | 18 | 29 | 67 | |
| Quinine 100mg/ml injection | 10 | 13 | 82 | |
| Salbutamol 0.5mg/ml injection | 76 | 81 | 90 | |
| Sodium chloride 500ml | 2 | 36 | 90 | |
| Syringes + needle | 0 | 13 | 67 | |
| Tetracycline 250mg tablet | 2 | 28 | 84 | |
| Tetracycline eye ointment 1% | 0 | 33 | 49 | 49 |
| Thermometer pack/piece | 9 | 66 | 61 | 61 |
| Vitamin A 100,000IU tablet | 38 | 35 | 78 | |
| Vaccine BCG 10-dose/amp | 4[a] | 26 | 90 | 0 |
| Vaccine DPT 20-dose/amp | 0.5[a] | 26 | 90 | 0 |
| Vaccine measles 20-dose/amp | 0.7[a] | 27 | 90 | 0 |
| Vaccine polio | 0[a] | 26 | 90 | 0 |
| **Overall** | **19** | **35** | **70** | **34** |

[a] These figures are the average of only the PNA and *dépôt de district*; no vaccines are stocked in the PRA.

### *Indicator 5. Average percentage of stock records that correspond with physical counts for a set of DMCI tracer drugs in MoH storage and health facilities*

This indicator measures the integrity of stock records. The average percentage of stock records that corresponds with physical counts is a measure of the quality of the stock record-keeping system. Low percentages of correspondence between stock records and physical counts may be the result of wastage or pilferage and may highlight problems of accountability, all of which contribute to financial losses.

Overall, across all facilities, 62 percent of stock records correspond to the physical count. When this figure is broken down by facility level, as shown in Table 13, inventory management as assessed by stock records is inadequate in the regional stores (50%), district stores (45%), *centres de santé* (42%), and *postes de santé* (58%) and adequate in the central store (94%) and the *cases de santé* (80%), although when the CaS value is recalculated for only nine drugs, the result is 53 percent. Since 1995 (Ickx et al. 1995), there has been a notable improvement in the percentage of records that correspond to physical stock at central and regional stores (21% and 25%, respectively, in 1995). However, there has been no improvement at district and facility level (61% and 56%, respectively, in 1995).

**Table 13. Average Percentage of Stock Records That Correspond with Physical Counts**

| Facility Type | All | | IMCI Districts | | Non-IMCI Districts | |
|---|---|---|---|---|---|---|
| | Number of Facilities | Percentage of Records Corresponding with Supplies | Number of Facilities | Percentage of Records Corresponding with Supplies | Number of Facilities | Percentage of Records Corresponding with Supplies |
| Case de santé | 17 | 80[a] | 8 | 82 | 9 | 78 |
| Poste de santé | 18 | 58 | 3 | 49 | 15 | 63 |
| Centre de santé | 6 | 42 | 2 | 38 | 4 | 43 |
| Dépôt de district | 6 | 45 | 2 | 41 | 4 | 47 |
| PRA | 3 | 50 | 1 | 65 | 2 | 43 |
| PNA | 1 | 94 | | | 1 | 94 |
| **Overall** | **51** | **62** | **16** | **63** | **35** | **62** |

[a] When this indicator is recalculated for the nine drugs of the *case de santé* level, the result is 53 percent.

Good stock control is generally easier at a more peripheral level because fewer drugs are stocked. At the central level, stock control is facilitated by a high number of specialized staff and computerized systems. The intermediary levels of regional and district stores and *centres de santé* stock the same number of different drugs, but they have fewer staff and no computerized systems. The low values for the correspondence of the physical stock with records indicate inadequate record-keeping.

Where the stock was zero, and there was no stock card for that product, the physical count was taken to correspond with the stock card. This situation is interpreted as good store management because there is no need for stock cards for products that are not stocked. It is the most likely

reason the *cases de santé* enjoyed a high result; when the analysis was rerun for the limited stock of nine drugs to be used at *cases de santé,* the indicator fell to 53 percent, comparable to the other facilities. Where stock cards as such did not exist, in 17 out of 51 facilities, other stock records were used, such as *cahiers d'enregistrement* (stock register notebooks).

### *Indicator 6. Percentage of MoH storage and health facilities visited that have a working refrigerator with freezing compartment and thermometer for vaccine storage*

### *Indicator 7. Percentage of MoH storage and health facilities with up-to-date monitoring records for refrigerator temperature*

All facilities carrying out vaccination or distributing vaccines should have a working refrigerator, which contributes to the ability to adequately maintain stocks of vaccines. For this indicator, the data collectors physically inspected the appliance to see if the following conditions for a working refrigerator were met:

- The condition of the refrigerator was either fair or good.
- The refrigerator had both a freezer watch indicator and a thermometer inside.
- The temperature at the time of inspection was between 2°C and 8°C.

If any of these conditions was not met, then the health facility was considered not to have a working refrigerator.

As shown in Table 14, of all the facilities surveyed, fewer than half (45%) had a working refrigerator. No regional stores had refrigerators because the vaccines are distributed directly from the central stores to district stores, where there were working refrigerators in only 83 percent of the stores visited. Only 50 percent of *centres de santé* and 28 percent of *postes de santé* possessed a functional refrigerator. Several of the *postes de santé* order their vaccines immediately before vaccination because there are no storage facilities. One *case de santé* had a refrigerator, but because CaS are not expected to carry out vaccination, this finding should be ignored. The poor availability of working refrigerators is currently being rectified by the MoH; new refrigerators have been purchased and will be distributed.

Indicator 7 is used to determine how well the facilities monitor the equipment that keeps the vaccines cold. Vaccines that are stored at improper temperatures at any point in the transport to the health facilities or in the facilities themselves may be damaged to the point of losing efficacy. To ensure that vaccines are not compromised, it is important to establish a system to monitor their storage temperature. Such a system would permit identification of any breakdown in the system and enable repair before damage occurs to the vaccines.

Of facilities with working refrigerators, 64 percent had up-to-date temperature monitoring charts. There was a tendency for monitoring of temperature to occur more often in the PS than in the CS. Overall, the level of monitoring of vaccine storage conditions is inadequate.

**Table 14. Availability of Working Refrigerators**

| Facility Type | Number of Facilities Surveyed | Facilities with a Working Refrigerator | Facilities with Up-to-Date Cards | Working Refrigerators with Up-to-Date Cards |
|---|---|---|---|---|
| Case de santé | N/A | N/A | N/A | N/A |
| Poste de santé | 18 | 5 (28%) | 4 | 4/5 (80%) |
| Centre de santé | 6 | 3 (50%) | 1 | 1/3 (33%) |
| Dépôt de district | 6 | 5 (83%) | 3 | 3/5 (60%) |
| PRA | N/A | N/A | N/A | N/A |
| PNA | 1 | 1 (100%) | 1 | 1/1 (100%) |
| **Overall** | **31** | **14 (45%)** | **9** | **9/14 (64%)** |

*Note*: N/A= not applicable

## Drug Use Study

### *Indicator 8. Percentage of MoH health facilities visited with an official manual of treatment guidelines for childhood illnesses, based on WHO IMCI treatment guidelines*

This indicator is used to measure the level of access to information to promote effective care and management of sick children through the use of standard treatment guidelines or the national IMCI guidelines. Because not all districts had implemented IMCI, these two aspects are considered separately. The private facilities were not assessed for this indicator. For the calculation of this indicator, the *ordinogrammes* for *postes de santé* are considered to be the national standard treatment guidelines.

### *Standard Treatment Guidelines*

The results in Table 15 show that the five storage facilities did not have a copy of the national standard treatment guidelines. Although one can argue that these facilities do not prescribe, it would be useful to have a copy of the STGs available in order to facilitate procurement.

Of the other 40 facilities surveyed, slightly more *postes de santé* (72%) have a copy of the standard treatment guidelines than do *centres de santé* (60%), but no *case de santé* has access to any guidelines. The majority (75%) of *centres de santé* and *postes de santé* where IMCI has not been introduced had a copy of the national standard treatment guidelines.

**Table 15. Availability of Official Manual of Treatment Guidelines**

| Facility Type | All | | IMCI Districts | | Non-IMCI Districts | |
|---|---|---|---|---|---|---|
| | Number of Facilities Surveyed | Facilities with STGs | Number of Facilities Surveyed | Facilities with STGs | Number of Facilities Surveyed | Facilities with STGs |
| Case de santé | 17 | 0 | 9 | 0 | 8 | **0** |
| Poste de santé | 18 | 13 (72%) | 6 | 4 (67%) | 12 | **9 (75%)** |
| Centre de santé | 5 | 3 (60%) | 1 | 0 | 4 | **3 (75%)** |
| Dépôt de district | 3 | 0 | 1 | 0 | 2 | **0** |
| PRA | 1 | 0 | 1 | 0 | | |
| PNA | 1 | 0 | | | 1 | **0** |
| **Overall** | **45** | **16 (36%)** | **18** | **4 (22%)** | **27** | **12 (44%)** |

### *IMCI Guidelines*

In Senegal, a national IMCI manual was adapted from the WHO IMCI guidelines and published by WHO, UNICEF, and the Senegalese Ministry of Health in 1999. It is intended for use by physicians, nurses, and other health care personnel who treat children and who have received training in IMCI case management.

As shown in Table 16, the five storage facilities surveyed did not have a copy of the national IMCI guidelines either. Of the other 40 facilities visited, IMCI guidelines were available only in one-third of all *postes de santé* and one-fifth of *centres de santé* overall. In the IMCI districts, all of the *postes de santé* and *centres de santé* have the IMCI guidelines available. The CaS have not yet been trained in IMCI and, not surprisingly, no IMCI guidelines were found there.

**Table 16. Availability of Official IMCI Manual**

| Facility Type | All | | IMCI Districts | | Non-IMCI Districts | |
|---|---|---|---|---|---|---|
| | Number of Facilities Surveyed | Facilities with IMCI Guidelines | Number of Facilities Surveyed | Facilities with IMCI Guidelines | Number of Facilities Surveyed | Facilities with IMCI Guidelines |
| Case de santé | 17 | 0 | 9 | **0** | 8 | 0 |
| Poste de santé | 18 | 7 (39%) | 6 | **6 (100%)** | 12 | 1 (8%) |
| Centre de santé | 5 | 1 (20%) | 1 | **1 (100%)** | 4 | 0 |
| Dépôt de district | 3 | 0 | 1 | **0** | 2 | 0 |
| PRA | 1 | 0 | 1 | **0** | | |
| PNA | 1 | 0 | | | 1 | 0 |
| **Overall** | **45** | **8 (18%)** | **18** | **7 (39%)** | **27** | **1 (4%)** |

The existence of a government-produced manual is a measure of the political commitment of the need to promote rational use of drugs in the care of sick children. The presence of a manual or standard treatment guideline in itself does not ensure good quality of care or rational prescribing,

but it does show that the MoH has made an effort to disseminate a reference source in support of rational prescribing and appropriate case management.

### *Indicator 9. Percentage of encounters diagnosed as no pneumonia (cough or cold) that are prescribed antibiotics*

### *Indicator 10. Percentage of encounters diagnosed as pneumonia that are prescribed appropriate antibiotics according to treatment guidelines*

These two indicators are complementary and attempt to measure the degree of adherence to IMCI treatment guidelines or the standard treatment guidelines for acute respiratory infections. Indicators 9 and 10 represent the positive and negative outcomes of the same area of prescribing practice. Both indicators are calculated from retrospective prescription data as well as observation of consultations.

For the purpose of the study, ARI was divided into pneumonia and no pneumonia (cough or cold). No pneumonia (cough or cold) represents more common self-limiting infections like the common cold, which are caused by viruses and thus should not be treated with antibiotics. Prescribing antibiotics for the common cold is a widely practiced inappropriate use of antibiotics. Using antibiotics when they are not needed is very costly; reduces availability for other, more serious health problems; and contributes to development of antibiotic resistance. The use of antibiotics to treat no pneumonia also indicates nonadherence to IMCI guidelines.

In developing countries, bacteria cause most cases of pneumonia. These cases need treatment with antibiotics, as stipulated by IMCI guidelines. However, antibiotics are costly therapies and are frequently overused, resulting in waste of money and drugs. Furthermore, antibiotic resistance to common infections has rendered some formerly useful drugs ineffective. Indiscriminate, empirical, and uninformed prescribing practices are partly to blame for this situation.

## *Prescribing of Antibiotics in Health Facilities*

In the 3,303 patient records of children studied, 52 percent had at least one antibiotic prescribed. This figure was higher in *centres de santé* (66%) than the other facilities. This difference could be because other facilities refer patients to a *centre de santé,* which implies that *centres de santé* treat more complex or severe cases, but since 90 percent of the patients at a *centre de santé* are estimated to be first attendances and not referred cases, it is more likely to be simply irrational prescribing.

Studying the cases of no pneumonia, shown in Table 17, it can be seen that a similarly high level of prescribing of antibiotics exists in *postes de santé* (66%) as in *centres de santé* (69%). In the *cases de santé,* almost every case of no pneumonia studied received a prescription for an antibiotic (92%), which is surprising because antibiotics are not even on the list of drugs to be used at *case de santé* level. According to the standard treatment guidelines and IMCI guidelines of Senegal, no pneumonia should not be treated with antibiotics. This indicator is lower in the

IMCI districts (34% in *postes de santé* and 21% in *centres de santé*) than in the non-IMCI districts (77% and 89%). These differences, although not conclusive, are probably due to the training and supervision of the health workers in the IMCI districts. In the *cases de santé*, IMCI districts showed a lower level (0) of antibiotic prescribing at *case de santé* level compared to non-IMCI districts (100%); however, this difference cannot be attributed to IMCI because the community health workers at *case de santé* level have not been trained.

**Table 17. No Pneumonia Cases Given Antibiotic**

| | All | | IMCI Districts | | Non-IMCI Districts | |
|---|---|---|---|---|---|---|
| Facility Type | Number of Cases | No Pneumonia Cases Given an Antibiotic | Number of Cases | No Pneumonia Cases Given an Antibiotic | Number of Cases | No Pneumonia Cases Given an Antibiotic |
| Case de santé | 51 | 47 (92%) | 4 | 0 | 47 | 47 (100%) |
| Poste de santé | 502 | 331 (66%) | 127 | 43 (34%) | 375 | 287 (77%) |
| Centre de santé | 162 | 112 (69%) | 48 | 10 (21%) | 114 | 100 (89%) |
| **Overall** | 715 | **493 (69%)** | 179 | **53 (30%)** | 536 | **434 (81%)** |
| Pharmacies | 27 | 7 (26%) | | | | |

Of the 82 simulated purchases for cases in private retail outlets, 17 percent were sold an antibiotic. Selecting only those simulated cases for no pneumonia (27), 26 percent were sold an antibiotic. This level of antibiotic prescribing for cases of no pneumonia is relatively low compared with the results from the public sector (69%), but still represents an inappropriate use of antibiotics.

Prescribing of antibiotics for pneumonia is shown in Table 18. The desired result is that the appropriate antibiotic is prescribed for each case of pneumonia. In the 322 cases of pneumonia studied, prescribing of antibiotics was high, 98 percent of cases overall receiving prescriptions for any antibiotic. The majority (86%) of these cases of pneumonia received the appropriate antibiotic. Very little difference was noted between the IMCI and non-IMCI districts.

**Table 18. Pneumonia Cases Given Antibiotic**

| | All | | | IMCI Districts | | | Non-IMCI Districts | | |
|---|---|---|---|---|---|---|---|---|---|
| Facility Type | Total Cases | Pneumonia Cases Given an Antibiotic | Cases Given Appropriate Antibiotic | Number of Cases | Pneumonia Cases Given Antibiotic | Cases Given Appropriate Antibiotic | Number of Cases | Pneumonia Cases Given Antibiotic | Cases Given Appropriate Antibiotic |
| Case de santé | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Poste de santé | 188 | 186 (99%) | 161 (86%) | 127 | 125 (98%) | 124 (98%) | 61 | 59 (97%) | 54 (89%) |
| Centre de santé | 134 | 131 (98%) | 115 (86%) | 51 | 51 (100%) | 47 (92%) | 83 | 80 (96%) | 73 (88%) |
| **Overall** | **322** | **317 (98%)** | **276 (86%)** | **178** | **176 (99%)** | **171 (96%)** | **144** | **139 (97%)** | **127 (88%)** |

No cases of pneumonia were encountered in the *cases de santé* or used as simulated cases in the private sector.

It is deduced from the results in both the public and private sectors that antibiotics are grossly overprescribed for cases of no pneumonia, particularly in the public sector, and possibly more so in districts where IMCI has not been implemented (although the sample was not statistically significant to confirm this possibility).

### *Indicator 11. Percentage of encounters diagnosed as diarrhea that are prescribed ORS*

Indicators 11, 12, and 13 measure the degree of adherence and nonadherence to STGs (*ordinogrammes*) or IMCI guidelines for treating uncomplicated diarrhea. They are calculated from retrospective prescription data as well as from observation of consultations. Complicated diarrhea, dysentery, and cholera were excluded from the sample. These indicators measure the percentage of diarrhea encounters for which ORS, antidiarrheals, or antibiotics are prescribed. Antibiotics and antidiarrheals are not recommended for treating simple diarrhea in children.

ORS should be the first treatment for a case of diarrhea; however, as shown in Table 19, its use is low. Of 779 patient records of children with diarrhea, only 60 percent received ORS. This result was slightly higher at *poste de santé* level (65%) than in *centres de santé* (49%) or *cases de santé* (54%). The low overall rate of use of ORS could be because they are not available in health facilities (only 67%) or because mothers have already given or were recommended to give sugar/salt solution at home. The *Enquête Sénégalaise sur les Indicateurs de Santé* (ESIS) of 1999 found similarly low rates of ORS usage for diarrhea in households; only 20 percent of children under five years with diarrhea received ORS, and another 34 percent received sugar/salt solution. Even so, this percentage is an increase from the mid-1980s when the rate was found to be only 2 percent (WHO 2000b).

When the districts were divided according to implementation of IMCI, a higher level of ORS prescribing was found in the IMCI districts (72%) than in the non-IMCI districts (56%) across all levels. When subdivided into levels of facilities, a higher use was observed in IMCI *centres de santé* and *cases de santé* than in non-IMCI, but similar levels were noted in IMCI and non-IMCI districts at *poste de santé* level. However, because IMCI has not been introduced at CaS level, the higher usage there cannot be attributed to the IMCI training. CaS workers are supervised by workers from the PS, so their knowledge of rational treatment with ORS may have been passed on. The relatively low use at PS level in both IMCI and non-IMCI districts may be attributable to a low availability of ORS in the facilities.

Of 27 simulated cases of simple diarrhea in the private sector, none were recommended or sold ORS. This result follows because ORS are generally not sold in pharmacies. ORS do not have a "visa" and therefore cannot be sold as a medicine.

**Table 19. Prescribing of ORS for Diarrhea Cases**

| Facility Type | All | | IMCI Districts | | Non-IMCI Districts | |
|---|---|---|---|---|---|---|
| | Total Diarrhea Cases | Cases Given ORS | Number of Diarrhea Cases | Cases Given ORS | Number of Diarrhea Cases | Cases Given ORS |
| Case de santé | 127 | 68 (54%) | 11 | 10 (91%) | 116 | 59 (51%) |
| Poste de santé | 476 | 309 (65%) | 128 | 79 (62%) | 348 | 229 (66%) |
| Centre de santé | 176 | 86 (49%) | 42 | 42 (100%) | 134 | 45 (34%) |
| **Overall** | **779** | **463 (60%)** | **181** | **131 (72%)** | **598** | **333 (56%)** |
| Pharmacies | 27 | 0 | | | | |

### *Indicator 12. Percentage of encounters diagnosed as diarrhea that are prescribed antidiarrheals*

This indicator is also calculated from retrospective prescription data as well as from observation of consultations.

Antidiarrheals are not indicated in cases of simple diarrhea, except in special circumstances, and therefore should be avoided. For the same number of diarrhea cases studied as for Indicator 11, a low level of antidiarrheal use (7%) was noted across all facilities of the public sector as shown in Table 20. Interestingly, all the cases of antidiarrheal prescriptions were noted in the non-IMCI districts. It is surprising that antidiarrheals are prescribed in the public sector because they are not on the standard treatment guidelines or essential drugs list and therefore are presumed not to be available in the public system. However, these drugs could have been prescribed and then purchased at a private drug outlet.

Of the same 27 simulated cases of diarrhea, antidiarrheals were recommended in 37 percent of the cases in the private sector.

**Table 20. Prescribing of Antidiarrheals for Diarrhea Cases**

| Facility Type | All | | IMCI Districts | | Non-IMCI Districts | |
|---|---|---|---|---|---|---|
| | Total Diarrhea Cases | Cases Given Antidiarrheals | Number of Diarrhea Cases | Cases Given Antidiarrheals | Number of Diarrhea Cases | Cases Given Antidiarrheals |
| Case de santé | 127 | 21 (17%) | 11 | 0 | 116 | 21 (18%) |
| Poste de santé | 476 | 19 (4%) | 128 | 0 | 348 | 17 (5%) |
| Centre de santé | 176 | 19 (11%) | 42 | 0 | 134 | 19 (14%) |
| **Overall** | **779** | **59 (7%)** | **181** | **0** | **598** | **57 (10%)** |
| Pharmacies | 27 | 10 (37%) | | | | |

### *Indicator 13. Percentage of encounters diagnosed as non-dysentery/non-cholera diarrhea that are prescribed antibiotics*

This indicator is also calculated from retrospective prescription data as well as from observation of consultations.

Simple cases of diarrhea should not be prescribed an antibiotic. Despite this guidance in the national guidelines, Table 21 shows that 64 percent of all the diarrhea patient records reviewed (779) received an antibiotic. The highest level of antibiotic use was seen in the *centres de santé* (83%), where it is expected that staff are more qualified than the other facilities, and moderate use was noted in the *cases de santé* (39%), where antibiotics are not even on the list of drugs for that level of facility, and therefore should not be used. No real difference was noted between IMCI and non-IMCI districts. Even in cases adhering to IMCI or standard treatment guidelines and prescribing ORS, in the majority an antibiotic was also added. In the private sector, antibiotics were encountered less frequently (26%) in the simulated cases of simple diarrhea, but never accompanied by ORS.

**Table 21. Prescribing of Antibiotics for Diarrhea Cases**

| | All | | IMCI Districts | | Non-IMCI Districts | |
|---|---|---|---|---|---|---|
| **Facility Type** | **Total Diarrhea Cases** | **Cases Prescribed Antibiotics** | **Number of Diarrhea Cases** | **Cases Prescribed Antibiotics** | **Number of Diarrhea Cases** | **Cases Prescribed Antibiotics** |
| Case de santé | 127 | 50 (39%) | 11 | 4 (36%) | 116 | 45 (39%) |
| Poste de santé | 476 | 304 (64%) | 128 | 81 (63%) | 348 | 219 (63%) |
| Centre de santé | 176 | 146 (83%) | 42 | 32 (76%) | 134 | 114 (85%) |
| **Overall** | **779** | **500 (64%)** | **181** | **117 (65%)** | **598** | **378 (63%)** |
| Pharmacies | 27 | 7 (26%) | | | | |

This indicator demonstrates an irrational use of medicines; antibiotics are an improper treatment for a case of simple diarrhea, promote an inefficient use of resources, and encourage antibiotic resistance.

### *Indicator 14. Percentage of encounters diagnosed as malaria that are prescribed an appropriate oral antimalarial, according to treatment guidelines*

This indicator measures the degree of adherence to STGs (*ordinogrammes*) or IMCI guidelines for the treatment of uncomplicated malaria and is calculated from retrospective prescription data as well as observation of consultations.

Table 22 shows an encouragingly high use of antimalarials (95%) in 1,217 patient records of cases of uncomplicated malaria in all health facilities, but the appropriate choice of antimalarial was noted in only 76 percent of cases. (Appropriate choice is defined as the first-line antimalarial according to both the *ordinogrammes* and the IMCI guidelines.) This result is unexpected because the first-line treatment for malaria has not changed in the recent past and availability of chloroquine in all health facilities is good.

**Table 22. Appropriate Malaria Treatment**

| Facility Type | All | | | IMCI Districts | | | Non-IMCI Districts | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total Cases | Malaria Cases Given an Antimalarial (AM) | Cases Given Appropriate AM | Number of Cases | Cases Given AM | Cases Given Appropriate AM | Number of Cases | Cases Given AM | Cases Given Appropriate AM |
| Case de santé | 261 | 227 (87%) | 188 (72%) | 16 | 14 (88%) | 14 (88%) | 245 | 213 (87%) | 174 (71%) |
| Poste de santé | 721 | 699 (97%) | 562 (78%) | 212 | 212 (100%) | 203 (96%) | 509 | 483 (95%) | 356 (70%) |
| Centre de santé | 235 | 227 (97%) | 175 (77%) | 67 | 67 (100%) | 65 (97%) | 168 | 160 (95%) | 114 (68%) |
| **Overall** | **1217** | **1153 (95%)** | **925 (76%)** | **295** | **293 (99%)** | **282 (96%)** | **922** | **856 (93%)** | **644 (70%)** |
| Pharmacies | 28 | 25 (89%) | 16 (57%) | | | | | | |

Dividing the districts according to IMCI implementation, it can be seen that the overall indicator of appropriate antimalarial prescribing was lower in the non-IMCI districts, although this sample is not statistically significant. In facilities of the IMCI districts, 96 percent of patients studied received a prescription for an appropriate antimalarial, whereas in the non-IMCI districts this indicator was only 70 percent, despite a high level of prescribing of some kind of antimalarial. In the IMCI districts, a trend was seen of better prescribing (higher rate of appropriate antimalarial) with decreasing peripheral nature, that is, prescribing was better in the *centres de santé* than in the *cases de santé.* This trend was not seen in the non-IMCI districts.

In 28 simulated purchases for uncomplicated malaria in the private sector, 89 percent received an antimalarial but only a moderate use (57%) of the appropriate antimalarial (chloroquine) was noted. National guidelines are, in general, not applied in the private sector, but it could be assumed that this practice is not owing to lack of knowledge of the guidelines, but rather to client demand or vendor preference.

### *Indicator 15. Average cost of drugs prescribed as a percentage of costs if IMCI norms for treatment were followed*

One of the basic tenets for promoting the IMCI strategy is that the use of standard treatment guidelines, if followed, will promote the rational use of drugs. The IMCI strategy also contributes to cost-effective and appropriate care that is likely to be cheaper than the cost of care if IMCI guidelines are not followed. On the basis of these assumptions, and using the recommended IMCI treatments, this indicator measures the average cost of drugs actually prescribed for an IMCI health condition, and then compares that sum to what drug treatment would cost if IMCI treatment guidelines had been followed. Treatment cost refers only to drug cost and not to labor or overhead costs. This indicator can also be used to demonstrate the average amount that families spend on inappropriate treatment when purchased at retail outlets. Drug prices for this study were based on the retail prices of drugs at private-sector pharmacies and an average of the price of all types of each drug encountered in the study was used for the calculation of each case. This indicator is calculated from retrospective prescription data as well as observation at consultation.

Interpretation of this indicator rests on the following two assumptions:

- The health worker has made the correct diagnosis.
- In the few cases (630 of 3,115 cases, or 20%) where multiple diagnoses were made, pneumonia was taken as the most important or complex diagnosis for that patient if present; otherwise malaria was used.

This indicator is a measure of the economic consequence to the MoH or to the individual of prescribing that does not adhere to the national guidelines. As shown in Table 23, overall the cost of an average prescription reviewed in the survey in the public sector is three times (306%) more than if the IMCI guidelines were followed.

**Table 23. Percentage Difference in Cost of Treatment of 4 IMCI Conditions Compared with IMCI Recommended Treatment**

| | All | | IMCI Districts | | Non-IMCI Districts | |
|---|---|---|---|---|---|---|
| **Facility Type** | **Number of Cases** | **Percentage Difference in Cost of Treatment** | **Number of Cases** | **Percentage of Cost** | **Number of Cases** | **Percentage of Cost** |
| Case de santé | 439 | 188 (2x) | 31 | 118 (1x) | 408 | 193 (2x) |
| Poste de santé | 1,887 | 276 (3x) | 594 | 159 (1.5x) | 1,293 | 329 (3x) |
| Centre de santé | 707 | 462 (5x) | 208 | 179 (2x) | 499 | 579 (6x) |
| **Overall** | **3,033** | **306 (3x)** | **833** | **163 (2x)** | **2,200** | **360 (4x)** |
| Pharmacies | 82 | 474 (5x) | | | | |

Within the public sector, a higher prescription cost is seen at *centre de santé* level (462% or nearly 5 times more expensive) than at *poste de santé* level (276%, 3 times more) or *case de santé* level (188%, 2 times more), which could suggest more complicated patients at a higher level of referral requiring more costly drugs. It could also suggest a higher degree of nonadherence to national guidelines, for example prescribing more expensive second-line drugs instead of the recommended first-line drugs. There is not a great difference in the number of drugs prescribed per patient among the levels of facilities (2.8 at CS level, 2.6 at PS level, 2.1 at CaS level), so the contributing factor to the increased cost of treatment is the choice of drug and not the number of drugs per case. This indicator complements Indicators 9–14 on rational use and demonstrates that the irrational use of antibiotics noted in those indicators translates into a higher cost of treatment. Although the sample is not statistically significant, possibly more cost-effective prescribing in the IMCI districts (1.6 times higher cost) is observed than in the non-IMCI districts (3.6 times higher cost).

Studying the prescription cost per condition in Table 24 shows that the condition most frequently found to be more costly is simple no pneumonia ARI across all facilities (overall more than 5 times more costly [563%]), and this added expense is caused by inappropriate use of antibiotics, which was illustrated under Indicator 9, as well as expensive cough and cold remedies. Diarrhea treatment is also more expensive (on average 3 times more costly), again partly attributable to the use of antibiotics, but primarily due to the low use of ORS, because any other treatment is more costly than ORS. Malaria treatment is usually not much more costly than

the guideline treatment, across all facilities, except at *centre de santé* level (not shown), where it is threefold more expensive. This cost could be attributable to either more complicated or referred patients, or irrational prescribing. Additional unnecessary drugs also could have increased the cost of treatment for the pneumonia cases.

**Table 24. Percentage Difference in Cost of Treatment Compared with IMCI Recommended Treatment Costs, by Condition**

| | All | | IMCI Districts | | Non-IMCI Districts | | Pharmacies | |
|---|---|---|---|---|---|---|---|---|
| Condition | Number of Cases Studied | Percentage Difference in Cost of Treatment | Number of Cases | Percentage of Cost | Number of Cases | Percentage of Cost | Number of Cases | Percentage of Cost |
| No pneumonia | 715 | 563% (6x) | 179 | 213 (2x) | 536 | 679 (7x) | 27 | 771 (7x) |
| Diarrhea | 779 | 302% (3x) | 181 | 209 (2x) | 598 | 330 (3x) | 27 | 431 (4x) |
| Malaria | 1,217 | 167% (2x) | 295 | 96 (1x) | 922 | 189 (2x) | 28 | 231 (2x) |
| Pneumonia | 322 | 278% (3x) | 178 | 177 (2x) | 144 | 401 (4x) | | N/A |

*Note:* N/A= not applicable

Again, dividing the districts into two groups according to IMCI implementation shows a possible difference in prescribing patterns, although the sample is not statistically significant. For all conditions, the non-IMCI districts consistently prescribed more costly drugs, ranging from 189 percent for malaria to 401 percent for pneumonia. Even in the IMCI districts, all conditions except malaria were treated with prescriptions more costly than IMCI guidelines, although the difference was not as great as in the non-IMCI districts.

The cost implications of irrational prescribing are more pronounced in the private sector, where cases of no pneumonia were prescribed drugs at seven times the cost of the national IMCI guideline treatment. The increased cost is greater in the private sector (474%) than in the public sector (306%) (Table 23), suggesting a higher level of inappropriate prescribing.

Although the prices of drugs from the private sector were used to calculate Indicator 15, information on the prices of drugs was also gathered in the public sector. A wide variation was noted in the prices of the same drug from facility to facility and among districts (Table 25). The greatest variation was seen for branded drugs, but a substantial variation was also seen with generic drugs (e.g., amoxicillin syrup prices ranged from CFAF 525 to CFAF 1,000 per bottle). This variation in price could mean that in a certain facility a certain drug could be unaffordable to a patient, whereas to that same patient in a different facility, the same drug at a lower price could be affordable. This pricing variation has serious implications on the financial accessibility of drugs. The prices of drugs in the private sector are all fixed.

**Table 25. Examples of Drug Prices Encountered in the Public Sector**

| Drug | Median Price (CFAF)[a] | Range of Prices (CFAF) |
|---|---|---|
| Paracetamol tablet | 9 | 8–10 (n = 2)[b] |
| Paracetamol syrup | 515 | 100–700 (n = 10) |
| Chloroquine tablet | 12.5 | 8–25 (n = 5) |
| Chloroquine syrup | 500 | 80–700 (n = 8) |
| Amoxicillin capsule | 45 | 40–50 (n = 2) |
| Amoxicillin syrup | 800 | 525–1159 (n = 11) |
| Co-trimoxazole tablet | 17.5 | 10–20 (n = 4) |
| Co-trimoxazole syrup | 620 | 400–1951 (n = 13) |
| Mebendazole tablet | 15 | 10–17 (n = 3) |
| Mebendazole syrup | 292.5 | 285–300 (n = 2) |
| Metronidazole tablet | 12.5 | 10–15 (n = 2) |
| Metronidazole syrup | 575 | 450–1000 (n = 6) |
| Aspirin tablet | 8.75 | 6–25 (n = 4) |
| Amodiaquine syrup | 1621.5 | 1517–1769 (n = 2) |
| ORS sachet | 87.5 | 50–180 (n = 6) |

[a] CFAF = *Communauté Financière Africaine Franc*
[b] "n" is the total number of different prices encountered in the survey.

### *Indicator 16. Percentage of prescribed drugs actually dispensed*

This indicator measures the ability of health facilities to dispense the right drug to caregivers and is calculated only from observation data of consultations and exit interviews.

As can be seen in Table 26, the majority (68% overall), but not all, of patients received their drugs as prescribed, this indicator value being higher for the *cases de santé* (90%) and *postes de santé* (72%) than at the *centres de santé* (53%). There are several possible reasons for this variance.

- Availability of drugs at the facility may be poor.
- Patients may prefer to buy their drugs from a private pharmacy, which can be cheaper because of the strict price controls of the private sector. Some patients believe that drugs are of a better quality in the private sector.
- Patients may have no money with them and may have to go home to get money or permission to buy drugs. Some such patients may have returned to the same facility later and been missed by the interviewers.

There seems to be an inverse relationship between the cost of treatment (Indicator 15) and whether it was dispensed (Indicator 16) among levels of care (i.e., the more costly prescriptions were, generally, not dispensed in full). Slightly better results were noted in the IMCI districts

(overall 78%) than in the non-IMCI districts (62%), which would indicate that the factor influencing this indicator is not drug availability, since both groups of districts had similar availability of drugs, but this result is not conclusive. This indicator was not studied in the private sector.

**Table 26. Drugs Dispensed as Prescribed**

| Facility Type | All | | IMCI Districts | | Non-IMCI Districts | |
|---|---|---|---|---|---|---|
| | Number of Drugs Prescribed | Number (%) Dispensed as Prescribed | Number of Drugs Prescribed | Number (%) Dispensed as Prescribed | Number of Drugs Prescribed | Number (%) Dispensed as Prescribed |
| Case de santé | 29 | 26 (90%) | 21 | 18 (86%) | 8 | 8 (100%) |
| Poste de santé | 780 | 561 (72%) | 309 | 250 (81%) | 471 | 310 (66%) |
| Centre de santé | 257 | 136 (53%) | 79 | 49 (63%) | 178 | 87 (49%) |
| **Overall** | **1,066** | **723 (68%)** | **409** | **317 (78%)** | **657** | **405 (62%)** |

### *Indicator 17. Percentage of caregivers who could correctly describe how to give the prescribed medication*

This indicator measures potential for nonadherence and possible treatment failure caused by the lack of knowledge among caregivers on how to administer medication correctly. Information was gathered only from observation of consultations. To correctly describe how to take the medication, the caregiver should know what dose to administer, how many times a day, and for how many days. All three of these items should be mentioned verbally by the caregiver to the data collector for the encounter to be considered correct.

It is clearly important for a caregiver to know how to administer the medicines correctly to the child. With inappropriate administration, the child may not be cured, drug resistance may be worsened, or other adverse effects may result. As shown in Table 27, only 59 percent of 288 caregivers surveyed in all facilities could describe how to administer the drugs to their children. This figure was higher in *cases de santé* (88%) (although the sample was too small to draw conclusions) and *postes de santé* (64%) than in the *centres de santé* (40%). This variation could result from the greater number of patients in a *centre de santé*, allowing health workers less time to explain administration to them. Only a small difference was observed between the IMCI districts (68%) and the non-IMCI districts (53%).

**Table 27. Caregivers Who Could Correctly Describe How to Give Prescribed Medication**

| Facility Type | All | | IMCI Districts | | Non-IMCI Districts | |
|---|---|---|---|---|---|---|
| | Number of Caregivers Surveyed at the Exit | Number (%) Able to Correctly Describe How to Take Drug | Number Surveyed | Number (%) Able to Describe | Number Surveyed | Number (%) Able to Describe |
| Case de santé | 8 | 7 (88%) | 6 | 5 (83%) | 2 | 2 (100%) |
| Poste de santé | 210 | 134 (64%) | 87 | 60 (69%) | 123 | 76 (62%) |
| Centre de santé | 70 | 28 (40%) | 27 | 17 (63%) | 43 | 11 (25%) |
| **Overall** | **288** | **169 (59%)** | **120** | **82 (68%)** | **168** | **89 (53%)** |

The findings demonstrate that about half of caregivers leave the health facilities without understanding how to administer the drugs that were prescribed for their children. This result suggests that any information given to the caregivers was either inadequate or not communicated well.

### *Indicator 18. Percentage of encounters where health workers asked one or more clinical questions from IMCI guidelines to determine severity of health problem*

IMCI requires that health workers assess and manage every sick child coming to the health facility in a comprehensive manner. The IMCI guidelines outline a series of screening questions concerning each child that promotes the evaluation, classification, and treatment of infants and children for the five IMCI health problems. Observing whether health workers ask clinical questions regarding the child's health problem will allow the identification of areas where IMCI training should focus. This indicator helps determine whether IMCI guidelines are being followed and whether the health workers who have not been trained in IMCI know general signs for referral to a hospital. The signs of severity are not only important to determine for IMCI but also for good clinical practice. The indicator is calculated from observation data of consultations as well as simulated purchases in private pharmacies.

As can be seen from Table 28, in a total of 296 patient encounters across all facilities, just over half (56%) were observed to have questions about severity posed. *Postes de santé* (61%) performed better than *centres de santé* (46%), which is surprising because more qualified and hence more capable staff are expected to be found at *centre de santé* level than at *postes de santé*.

At the time of the survey, IMCI had been introduced in only two districts that were part of the DMCI sample. When the districts are divided according to whether they have implemented IMCI, a large difference was noted between the IMCI districts (87%) and the non-IMCI districts (35%). This finding suggests that either the IMCI training or the prompting from the IMCI forms helps the health workers to consider asking questions about severity. However, even in the IMCI districts, the *postes de santé* performed better than the *centres de santé.*

**Table 28. Health Workers Who Asked One or More Questions to Determine Severity**

| | All | | IMCI Districts | | Non-IMCI Districts | |
|---|---|---|---|---|---|---|
| **Facility Type** | **Health Workers Surveyed** | **Number (%) Who Asked Questions** | **Number Surveyed** | **Number (%) Who Asked Questions** | **Number Surveyed** | **Number (%) Who Asked Questions** |
| Case de santé | 8 | 1 (13%) | 6 | 0 | 2 | 1 (50%) |
| Poste de santé | 217 | 132 (61%) | 87 | 86 (99%) | 130 | 45 (35%) |
| Centre de santé | 71 | 33 (46%) | 27 | 18 (67%) | 44 | 15 (34%) |
| **Overall** | **296** | **166 (56%)** | **120** | **104 (87%)** | **176** | **61 (35%)** |
| Pharmacies | 82 | 17 (21%) | | | | |

Of 82 simulated purchases, 21 percent of providers asked questions about the severity of the problem. The fact that this action occurs at all in the private sector is encouraging and indicates

the importance of this result not only as a measure of IMCI training, but also an indicator of quality of service or care.

### *Indicator 19. Percentage of health workers who provided basic information to caregivers on how to give the recommended drugs*

This indicator measures whether health workers communicated to patients how to take their medication and is calculated only from observation data of consultations. This component is important in gaining an understanding of patient use of medication and patient education, and if this indicator is linked to Indicator 17, it can be used to pinpoint communication problems between the health worker and the caregiver.

As shown in Table 29, there is a relatively high level (86% across all facilities) of communication of information about dosing of drugs by health workers to caregivers, although it is lower in *centres de santé* (76%) than the other facilities and overall is lower in the non-IMCI districts (79%) than the IMCI districts (96%), although the sample size is not statistically significant.

**Table 29. Health Workers Who Provided Information to Caregivers on How to Give Recommended Drugs**

| | All | | IMCI Districts | | Non-IMCI Districts | |
|---|---|---|---|---|---|---|
| **Facility Type** | **Number of Health Workers Surveyed** | **Number (%) Providing Information on How to Take Medicine** | **Number Surveyed** | **Number (%) Providing Information** | **Number Surveyed** | **Number (%) Providing Information** |
| Case de santé | 8 | 8 (100%) | 6 | 6 (100%) | 2 | 2 (100%) |
| Poste de santé | 217 | 191 (88%) | 87 | 85 (98%) | 130 | 107 (82%) |
| Centre de santé | 71 | 54 (76%) | 27 | 24 (89%) | 44 | 30 (68%) |
| **Overall** | **296** | **253 (86%)** | **120** | **115 (96%)** | **176** | **139 (79%)** |
| Pharmacies | 82 | 26 (32%) | | | | |

This indicator shows that most caregivers had received explanations, but Indicator 17 showed that almost half the caregivers did not understand how to administer the drugs to their children when they left the health facility. This disparity indicates a communication gap between health workers and caregivers, the method of communicating information to the patients was ineffective or the information provided was inadequate.

From the 82 simulated purchases in the private sector, les than one-third (32%) of providers gave information about how to administer the drugs. The cause could be lack of knowledge on the part of the vendor or lack of incentive or motivation to give instructions.

These results emphasize the need to address information and communication strategies in both the public and private sector in order to ensure that drug treatments are taken appropriately.

### *Indicator 20. Percentage of health workers who told caregivers about any signs of progressive illness and recommended a visit to the doctor or clinic if the signs appear*

The IMCI guidelines recommend that all patients be evaluated, diagnosed, treated, and given follow-up. This process permits detection of both acute and chronic conditions. The ability of health workers to ensure follow-up care and parent education is an essential component of the IMCI process. Therefore, this indicator focuses on whether the health worker is communicating to the caregiver signs of progressive illness and encouraging follow-up treatment. Rapid identification of acute cases of illness may improve the health facility's ability to treat children adequately and reduce child mortality. The indicator is calculated from data obtained by observing consultations as well as simulated purchases in private pharmacies.

As seen in Table 30, in 296 patient encounters that were observed, only 43 percent of health workers in all health facilities gave information about what signs of progressive illness would justify referral. The lowest result came from the *centres de santé* (38%), where it is expected that health workers are more knowledgeable and understand the importance of this information. Is the fact that few health care workers give this information due to time pressures of too many patients, lack of knowledge or qualified staff, or lack of interest or motivation to give such information? Although inconclusive, a difference was observed between the IMCI districts (59%) and the non-IMCI districts (32%), but even the IMCI *centre de santé* level still gave information less often (48%) about signs of disease progression than the *postes de santé* (63%) and *cases de santé* (50%).

**Table 30. Health Workers Who Told Caregivers about Signs of Progressive Illness**

| Facility Type | All | | IMCI Districts | | Non-IMCI Districts | |
|---|---|---|---|---|---|---|
| | Number of Health Workers Surveyed | Number (%) Who Told about Progressive Illness | Number Surveyed | Number (%) Who Told | Number Surveyed | Number (%) Who Told |
| Case de santé | 8 | 5 (63%) | 6 | 3 (50%) | 2 | 2 (100%) |
| Poste de santé | 217 | 95 (44%) | 87 | 55 (63%) | 130 | 40 (31%) |
| Centre de santé | 71 | 27 (38%) | 27 | 13 (48%) | 144 | 46 (32%) |
| **Overall** | **296** | **127 (43%)** | **120** | **71 (59%)** | **176** | **56 (32%)** |
| Pharmacies | 82 | 0 | | | | |

In the 82 simulated purchases, no private-sector vendor gave information about signs of continued or progressive illness, which indicates either a lack of interest in the well-being of the patient or a lack of knowledge.

DMCI Indicators 21 (measles cases prescribed Vitamin A) and 22 (cases of anemia prescribed iron) were not investigated in Senegal because they were not considered necessary to study by the DMCI MoH working group.

### *Indicator 23: Percentage of cases that received nutritional advice*

This indicator measures not only the adherence to IMCI guidelines but also the degree of good clinical practice in managing sick children. Caregivers of sick children should be given advice neither to stop regular feeding nor to increase feeding while a child is sick. Of particular importance are cases of diarrhea, where caregivers often misguidedly think that an increased fluid intake replaces the need to feed the child. This indicator is calculated from observation data of consultations as well as simulated purchases in private pharmacies.

Table 31 shows that of 296 observed patient encounters, only 41 percent of patients were given advice on nutrition. This value is low; all caregivers of sick children should be advised to continue feeding. Despite the statistically nonsignificant sample size, a difference was observed between the practice of the IMCI districts, where 74 percent of cases received nutritional advice, and the non-IMCI districts, where only 18 percent received nutritional advice. The results for this indicator came only from the prospective part of the survey, that is, the observed cases and not the patient records.

**Table 31. Health Workers Who Gave Nutritional Advice to Caregivers**

| Facility Type | All | | IMCI Districts | | Non-IMCI Districts | |
|---|---|---|---|---|---|---|
| | Number of Health Workers Surveyed | Number (%) Who Gave Nutritional Advice | Number Surveyed | Number (%) Advising | Number Surveyed | Number (%) Advising |
| Case de santé | 8 | 2 (25%) | 6 | 2 (33%) | 2 | 0 |
| Poste de santé | 217 | 89 (41%) | 87 | 68 (78%) | 130 | 22 (17%) |
| Centre de santé | 71 | 29 (41%) | 27 | 19 (70%) | 44 | 10 (23%) |
| **Overall** | **296** | **120 (41%)** | **120** | **89 (74%)** | **176** | **32 (18%)** |
| Pharmacies | 82 | 0 | | | | |

From the simulated purchases in private retail drug outlets, no cases in the private sector were given nutritional advice, not even cases of diarrhea. Does this reflect a lack of concern for patient welfare as well as a profit motivation?

### *Indicator 24: Percentage of caregivers receiving antibiotics and antimalarials who could correctly describe how to give the drug*

For good case management, it is not sufficient only to have drugs prescribed rationally but the correct drug should also be administered in the appropriate quantity to ensure that the patient gets the appropriate treatment. This indicator was calculated from data obtained by observing consultations and by performing exit interviews and was determined by the information obtained from the caregiver. The indicator is a judgment of whether the caregiver understood how to administer the drugs correctly at home and, therefore, whether there is a chance the drugs will actually be administered correctly to the sick child (this indicator is an extension of Indicator 17).

Of 193 antibiotics prescribed in the encounters observed in the public facilities, only 37 percent may be correctly administered (see Table 32) according to the knowledge of the caregiver on leaving the facility.

**Table 32. Percentage of Antibiotics Prescribed That May Be Correctly Administered**

| | All | | IMCI Districts | | Non-IMCI Disticts | |
|---|---|---|---|---|---|---|
| **Facility Type** | **Number of Antibiotic Prescriptions Surveyed** | **Administration Correctly Described (%)** | **Number Surveyed** | **Administration Correctly Described (%)** | **Number Surveyed** | **Administration Correctly Described (%)** |
| Case de santé | 5 | 1 (20%) | 4 | 0 | 1 | 1 (100%) |
| Poste de santé | 137 | 55 (40%) | 59 | 21 (36%) | 78 | 34 (44%) |
| Centre de santé | 51 | 16 (31%) | 14 | 8 (57%) | 37 | 8 (22%) |
| **Overall** | **193** | **72 (37%)** | **77** | **29 (38%)** | **116** | **43 (37%)** |

It can be seen in Table 32, that there is little difference in the results between the IMCI and non-IMCI districts overall.

Of the 303 cases of prescriptions of antimalarials in the observed patient encounters, none of the caregivers knew how to administer the drug correctly.

Antibiotics and antimalarials were chosen for this indicator because if they are not administered correctly, there is potential for resistance to develop as well as failure to cure the sick child. However, this indicator is somewhat subjective since the answers from the caregiver upon leaving the facility in no way indicate how the drugs will actually be administered after the caregiver is at home.

# LIMITATIONS OF THE DATA

## The Use of Indicators

Standardized indicators to assess pharmaceutical sectors have been widely used for many years by MSH/RPM and other organizations such as WHO and PAHO. Indicator-based studies are cost-effective tools that measure, in a relatively short time, complex systems and give the investigators a snapshot of an overall trend in the sector. However, and despite their overall advantages, the DMCI indicators do not put these measurements in the social and economic context in which a local pharmaceutical system exists at the time of the study. Additional information about the sector is needed to determine which of the measures have the most weight to be regarded as good indicators for monitoring purposes.

All the above issues should be taken into consideration in interpreting the results of this assessment. Other sources of studies and data, specifically on the role of the private sector, are needed to get a real grasp of the situation in the pharmaceutical sector.

## The Study Design

The study design used is intended to give a rapid overview of the system to diagnose problem areas. Certain assessment methodologies are used to assess practices without going deeper into the reasons for them. For any intervention to be targeted at problem areas, a full analysis of the situation and discussions with stakeholders would be required.

There are some weaknesses in the study design, as raised in the interpretation of the results, such as the use of one diagnosis for the cost calculations and the difficulties ensuring observed patients are followed up in exit interviews.

The sample size was insufficient to allow meaningful comparisons to be drawn between the IMCI and non-IMCI districts. However, it allows certain tendencies or observations to be highlighted and pursued further.

## Issues Raised by the Data Collectors

During the data collection period, the data collectors commented on certain issues that they observed. The following list represents a summary of those observations:

- They experienced excellent collaboration by health facility staff.
- There were a lack of stock cards and general poor management of inventory records. However, information was gathered from a multitude of sources, not just the stock cards, to ensure data were available to calculate the indicators.

- Patient records were often incomplete and the registers were not well maintained in all facilities: pages missing, numbers out of sequence, illegible writing, absence of symptoms or diagnoses, absence of drug information (dose, frequency, duration of treatment). The staff of the health facility provided any missing information, although sometimes it was difficult to discover a standard practice when information was missing from the registers because many different health workers carry out consultations.

- An absence of responsible staff in some selected health facilities meant that a second visit was needed or another facility was chosen, deviating from the original sampling frame.

- There were problems finding *cases de santé* that were operational. *Cases de santé* were surveyed in only four districts: Sokone, Kaffrine, Kebemer, and Ziguinchor, with the majority of *cases de santé* being found in Sokone and Kebemer.

# CONCLUSIONS

Senegal has made great progress in improving child health as can be seen from the decreasing child mortality figures. IMCI has been introduced in three districts in 2 of the country's 10 regions and there are plans to expand it further. The Ministry of Health has made great efforts to improve the pharmaceutical distribution system, and its achievements can be seen in the good availability of drugs at central, regional, and district stores levels. There is also effective control of prices in the private sector to protect patients from high prices.

This DMCI study highlights some problems in the drug management system and shows weaknesses, especially at the periphery, in all areas of the drug management cycle. When districts where IMCI is already implemented were compared with districts where IMCI was not yet implemented, IMCI districts seem to demonstrate a better profile of drug use and information communication, although this trend would need further investigation because the sample was not large enough to draw conclusive evidence.

An important area of child survival is preventive activities, such as vaccination. Vaccination is dependent on the cold chain, and the problems of lack of functioning refrigerators identified in this survey can hamper further improvements in effective vaccination coverage.

Studying the stages of the drug management cycle, we can draw some conclusions from the results of the DMCI assessment in Senegal.

## Selection

In order for drugs to be in the public system, they need to be procured by the PNA. The procurement follows the national essential drugs list, which should be developed and regularly updated to meet the majority of the needs of the country. If IMCI is to be implemented effectively in Senegal, all drugs included in the IMCI guidelines need to be on the national EDL in order to ensure that they are procured and available to be distributed to the health facilities. This was not the case in Senegal at the time of the survey, but has since been corrected.

## Procurement

Procurement is generally efficient. In general, good prices were obtained by the PNA in the last tender. However, this cost saving to the public system and to patients is not maintained because of the irrational use of drugs. Some of the high-consumption drugs that were procured at prices higher than the MIP need to be studied to enhance further cost savings.

## Distribution

There is a very good availability at all levels of storage facilities, the best being at central level. Although overall the trend is toward lower availability at facility level, certain drugs are more readily available than others at facility level, implying that a distribution system exists but is not uniformly applied to all drugs. The more peripheral facilities generally have poorer availability.

Availability was shown to be a more chronic problem, especially at facility levels, where drugs are unavailable for a third of the year. Poor availability could be caused by many factors including poor record-keeping and inventory management or inadequate quantification of needs. Problems with record-keeping were noted in all levels of facilities except the central PNA.

## Use

Reference sources on prescribing choices such as national standard treatment guidelines can facilitate rational prescribing; however, a reference source was present in less than half of the facilities visited. The mere presence of a reference source, however, does not guarantee rational prescribing. The distribution of IMCI guidelines in those districts where IMCI is implemented was good.

In general, adequate prescribing was encountered across all levels for pneumonia and malaria, but some irrational use of drugs, particularly antibiotics, was noted at all health facilities for diarrhea and no pneumonia. Cases of no pneumonia were slightly better managed at *centre de santé* and *poste de santé* level than at *case de santé* level, where antibiotics were prescribed for a majority of cases. This practice was reflected in the pharmacies also. IMCI training seems to reduce the level of inappropriate antibiotic prescribing for cases of ARI no pneumonia.

Cases of diarrhea were in general better managed at *poste de santé* level, although IMCI seems to have had a greater impact on ORS usage at *centre de santé* and *case de santé* level. Prescribing of antidiarrheals is less of a problem in Senegal than the high prescribing of antibiotics, particularly at *centre de santé* level. IMCI seems to have made little difference on antibiotic prescribing; across all levels, little difference is observed between non-IMCI and IMCI districts. The private sector, in fact, showed the lowest level of antibiotic prescribing for simple diarrhea. The irrational use of drugs for diarrhea and no pneumonia is reflected as higher drug treatment costs, particularly at *centre de santé* level, indicating an inadequate use of economic resources for the system and patients.

## Patient Management

Although the DMCI survey focuses on drug management and is not an assessment of the quality of care, certain aspects of the service provided are crucial to appropriate drug treatment, such as appropriately assessing the patient, dispensing the correct drugs, and communicating how to administer the drugs at home. Problems were noted during patient consultations, where health workers were not adequately assessing the severity of the condition, thereby compromising

chances of reaching the correct diagnosis and prescribing the appropriate treatment. Effective communication is essential and needs improvement. In all health facilities it was found that although most health care workers gave instructions to caregivers on drug administration, only about half of caregivers knew what to do with the drugs as they left the facility. Without doubt, this understanding would be even lower by the time they reached home and were administering the drugs to their children. Insufficient associated information, for example on nutrition and disease progression, was passed on to caregivers at all facilities, but in particular at the *cases de santé,* and patients were assessed appropriately in only about half of the cases observed.

## Summary

Although drug management in Senegal has several strong points, the weaker points need to be focused on in order to improve the overall drug management of childhood illnesses. Since health facilities are where patients are treated, that is where the drugs are needed. Therefore, the distribution system needs to work on getting the drugs from the stores to the facilities.

It is assumed that the majority of patients are seen first at *poste de santé* level and in the private pharmacies; thus, these are the areas to focus on for greatest impact. The role and functionality of the *case de santé* should be reconsidered. During the survey, it was observed that many CaS are not operational and that the types of drugs supposed to be stocked there may be insufficient for the majority of patient needs. Hence, many patients skip that first entry point to the health system and go to the *poste de santé* or to a private pharmacy.

It has been observed that there may be improved patterns of drug use associated with IMCI. However, this anecdotal evidence should be investigated and the sustainability assessed before expanding IMCI to other districts. If improvement is the result of recent training and little follow-up or supervision is provided, then this difference is expected to decrease with time.

In summary, the main problems areas were found to be—

- Cold chain
- Selection of drugs (EDL list ≠ IMCI list)
- Low availability of certain drugs in health facilities
- Inadequate stock management and record-keeping
- Excessive use of antibiotics for no pneumonia
- Insufficient use of ORS for diarrhea
- Excessive use of antibiotics for diarrhea
- Increased costs due to irrational treatment
- Inadequate communication of how to administer drugs to patients and other information
- Insufficient assessment of severity of disease by health workers

# NEXT STEPS

## Recommendations and Next Steps

The results presented in this report indicate specific problems in the availability and use of IMCI drugs in Senegal. The indicators in the DMCI should be viewed as the first step in a process of investigation of the problems that were discussed in the report. The findings can help MoH managers and district health managers to focus attention on the most acute problem areas of availability and use of IMCI drugs and medical supplies and discuss them with key stakeholders in drug supply management and IMCI implementation. The feedback of these meetings should be presented and shared with policy and decision makers.

Before any appropriate interventions can be implemented, further investigation would be required to determine the causes of the problems identified in order to effectively target interventions. This investigation can take the form of focus group discussions, peer group work, and key informant interviews.

The recommendations from the DMCI survey results have been grouped according to the stages of the drug management cycle discussed in the conclusions. However, some recommendations do not pertain to one particular area of the cycle and are discussed in the following "General Issues" section.

## General Issues

These recommendations can influence policy and implementation of health plans at both central and district levels.

1. Ensure coordination, collaboration, and communication between IMCI and drug departments of the MoH at national level to ensure coherent policies on issues such as the following:

    - Update the national essential drugs list through policy dialogue with IMCI stakeholders to ensure that all drugs essential for IMCI are procured and distributed through the system

    - Harmonize the national STGs, the Senegal IMCI treatment protocols, and the EDL

    - Coordinate inclusion of drug logistics in planning processes of new treatment protocols

2. Review at central level the anticipated role of the *case de santé* and assess its functionality.

## Selection

Appropriate selection affects all stages of the drug management cycle and thus is a crucial area in which to intervene.

3. At central level, use evidence-based criteria and a systematic process to update the EDL to ensure that the most cost-effective drugs are used in the system.

4. At central level, but involving peripheral-level staff, review the EDL by facility level, especially for the *case de santé*, to ensure that the appropriate IMCI drugs are included at the appropriate levels, in line with the guidelines.

## Procurement

In order for drugs to be in the system and to be financially accessible to the population, effective procurement needs to take place. The procurement was largely found to be effective, with two possible recommendations:

5. Study the suppliers and quantities of drugs purchased for those drugs where the procurement price was more than the median international price. Review the tender process accordingly.

6. Continue to monitor quality of drugs.

## Distribution

The distribution system is the key to drugs being available at facility level where the patients are, and this function seems to be a problem in Senegal. The following recommendations need to be discussed for feasibility and prioritized for interventions:

7. Integrate drug management training into the IMCI training plan. This training should be coordinated between the DAN and the DPM, as well as other partners interested in drug management, and should be targeted to all the different categories of health workers at *centres de santé* and *postes de santé* as well as the community-based health workers in the *cases de santé.*

8. Ensure simple store management tools such as reporting forms and stock cards are available at all levels for use in storage facilities as well as health facilities.

9. Improve links between health facilities and stores. Better coordination and communication of stock availability and consumptions patterns is needed.

10. At central, regional, and district level, reassess the role of the regional stores to determine its cost-effectiveness and to ensure that it is not just another bottleneck in the distribution chain.

## Rational Drug Use

Inadequate availability of drugs at *centres de santé*, *postes de santé*, and *cases de santé* can contribute to irrational use of drugs, but insufficient information and lack of training and supervision are also contributing factors. The lack of control of the price margins in the public sector could be another additional factor influencing choice of drug and causing a less rational choice of drugs. This finding means that multifocused interventions will be necessary, and training alone is insufficient.

11. Disseminate the national STGs and the Senegal IMCI treatment protocols to all health facilities and storage facilities.

12. At central level, review the prices of the public sector and establish a system to control the margins applied between facilities.

13. Expand IMCI as a form of rational drug use training, targeting the different categories of health workers at the *centres de santé* and including community-based health workers at *case de santé* level.

14. At central level, develop and introduce easy-to-read drug management and rational drug use visual aids, flow charts, and posters in all health facilities.

15. At central level, redesign patient registers to facilitate completion with all necessary information including drug dosing.

16. At central level, advocate and encourage the use of key IMCI essential drugs, such as ORS or the first-line antimalarial in the private sector. This encouragement could take the form of reduced tax on purchase or some other incentive.

## Patient Management

It is not sufficient to strive for only rational prescribing because if the dispensing is not correct, inappropriate treatment (underdose or incorrect drug) could still result. Other aspects of patient management such as information on disease progression and referral are crucial and should be given at every consultation.

17. At district level, work with health workers, district health teams, and specialists in information, education, and communication to develop guidelines on drug dispensing and effective communication of information about drug administration to caregivers.

# REFERENCES


*Enquête Sénégalaise sur les Indicateurs de Santé. Sénégal Santé pour tous* (ESIS). 1999. Dakar: Ministry of Health, SERDHA, MEASURE Demographic Health Survey+, Macro International.

Guimier, J.-M., and D. Candau. 2001. *Etude sur l'accessibilité au médicament*. Rapport définitif. Dakar: Ministère de la Santé Publique & Syndicat National de l'Industrie Pharmaceutique.

Ickx, P., R. Morsly, M. Simonet, R. Watt, and J.-P. Sallet. 1995. *Réforme de la Pharmacie Nationale d'Approvisionnement du Sénégal, Etude*. Arlington, VA: Ministère de la Santé Publique & Management Sciences for Health.

Keene, D., P. Ickx, and J. McFadyen. 2000. *Drug Management for Childhood Illness Manual.* Published for U.S. Agency for International Development by Rational Pharmaceutical Management. Arlington, VA: Management Sciences for Health.

Management Sciences for Health (MSH). 1997. *Managing Drug Supply: The Selection, Procurement, Distribution, and Use of Pharmaceuticals in Primary Health Care.* 2d ed. West Hartford, CT: Kumarian Press.

McFadyen, Julie E., ed. 2000. *International Drug Price Indicator Guide.* Boston, MA: Management Sciences for Health with support by the Strategies for Enhancing Access to Medicines Initiative, with funding from the Bill & Melinda Gates Foundation.

PDIS. 2000. *Rapport Financier Plan de Développement Intégré de la Santé (PDIS) du 31/12/2000*. Dakar: Ministère de la santé et de la prévention; Direction de l'administration générale et de l'équipement; Bureau de l'analyste financier.

UNICEF. 2001. *The State of the World's Children* <www.unicef.org/sowc01/tables/mortality.htm>.

World Bank. 2000. *World Bank Development Report 1999/2000: Entering the 21st Century*. New York: Oxford University Press.

World Bank. 2001. *World Health Indicators*. CD-ROM.

World Health Organization (WHO). 1999. *The World Health Report 1999—Making a Difference*. Geneva: WHO.

WHO. 2000a. Special theme—Inequalities in Health. *Bulletin of the World Health Organization* 78(1): 1–152.

WHO. 2000b. Special theme—Child Mortality. *Bulletin of the World Health Organization* 78(10): 1172–1282.

WHO. 2001. *The World Health Report 2001—Mental Health: New Understanding, New Hope*. Geneva: WHO.

WHO. *Basic Health Indicators*. In WHO Statistics at <www.who.int>.

# ANNEX 1. DMCI INDICATORS

## Standard DMCI Indicators

The assessment consists of 7 drug availability indicators and 13 drug use indicators.

### *Drug Availability Indicators*

Indicator 1. Percentage of DMCI tracer drug products on the Essential Drug List (EDL)
*Information is collected at central level only.*

Indicator 2. Percentage of median international price paid for a set of DMCI tracer drugs that were part of the last regular MoH procurement
*Information is collected at central level only.*

Indicator 3. Average percentage of a set of unexpired DMCI tracer drugs available in MoH storage and health facilities
*Information is collected at all health and storage facilities*.

Indicator 4. Average percentage of time out-of-stock for a set of DMCI tracer drugs in MoH storage and health facilities
*Information is collected at all health and storage facilities*.

Indicator 5. Average percentage of stock records that correspond with physical counts for a set of DMCI tracer drugs in MoH storage and health facilities
*Information is collected at all health and storage facilities*.

Indicator 6. Percentage of MoH storage and health facilities visited that have a working refrigerator with freezing compartment and thermometer for vaccine storage
*Information is collected at all health and storage facilities*.

Indicator 7. Percentage of MoH storage and health facilities with up-to-date monitoring records for refrigerator temperature
*Information is collected at all health and storage facilities*.

### *Drug Use Indicators*

Indicator 8. Percentage of MoH health facilities visited with an official manual of treatment guidelines for childhood illnesses, based on WHO IMCI treatment guidelines
*Information is collected at all health and storage facilities*.

Indicator 9. Percentage of encounters diagnosed as no pneumonia (cough or cold) that are prescribed antibiotics

*Information is gathered from retrospective prescriptions and observations of consultations in public facilities and simulated purchases in private pharmacies*.

Indicator 10. Percentage of encounters diagnosed as pneumonia that are prescribed appropriate antibiotics according to treatment guidelines
*Information is gathered from retrospective prescriptions and observations of consultations in public facilities*.

Indicator 11. Percentage of encounters diagnosed as diarrhea that are prescribed ORS
*Information is gathered from retrospective prescriptions and observations of consultations in public facilities and simulated purchases in private pharmacies*.

Indicator 12. Percentage of encounters diagnosed as diarrhea that are prescribed antidiarrheals
*Information is gathered from retrospective prescriptions and observations of consultations in public facilities and simulated purchases in private pharmacies*.

Indicator 13. Percentage of encounters diagnosed as nondysentery/noncholera diarrhea that are prescribed antibiotics
*Information is gathered from retrospective prescriptions and observations of consultations in public facilities and simulated purchases in private pharmacies*.

Indicator 14. Percentage of encounters diagnosed as malaria that are prescribed an appropriate oral antimalarial, according to treatment guidelines
*Information is gathered from retrospective prescriptions and observations of consultations in public facilities and simulated purchases in private pharmacies*.

Indicator 15. Average cost of drugs prescribed as a percentage of costs if IMCI norms for treatment were followed
*Information is gathered from retrospective prescriptions and observations of consultations in public facilities and simulated purchases in private pharmacies*.

Indicator 16. Percentage of prescribed drugs actually dispensed
*Information is gathered from observations of consultations and exit interviews in public facilities.*

Indicator 17. Percentage of caregivers who could correctly describe how to give the prescribed medication
*Information is gathered from observations of consultations and exit interviews in public facilities.*

Indicator 18. Percentage of encounters where health workers asked one or more clinical questions from IMCI guidelines to determine severity of health problem
*Information is gathered from observations of consultations in public facilities and from simulated purchases in private pharmacies.*

Indicator 19. Percentage of health workers who provided basic information to caregivers on how to give the recommended drugs
*Information is gathered from observations of consultations in public facilities and from simulated purchases in private pharmacies.*

Indicator 20. Percentage of health workers who told caregivers about any signs of progressive illness and recommended a visit to the doctor or clinic if the signs appear
*Information is gathered from observations of consultations in public facilities and from simulated purchases in private pharmacies.*

## Supplemental Optional Indicators

Indicator 21. Percentage of encounters diagnosed as measles that are prescribed vitamin A [not investigated in Senegal]

Indicator 22. Percentage of encounters diagnosed as anemia that are prescribed iron [not investigated in Senegal]

Indicator 23. Percentage of cases that receive nutritional advice
*Information is gathered from observations of consultations in public facilities and from simulated purchases in private pharmacies.*

Indicator 24. Percentage of antibiotics and antimalarials prescribed that were correctly dispensed (i.e., the required quantity of medication to complete the standard course of therapy, as well as the correct drug, dosage strength, and regimen) [not measured as such in Senegal]
*Information is gathered from observations of consultations and exit interviews in public facilities.*

# ANNEX 2. COLLABORATORS

## DMCI Working Group

Professor Guelaye Sall, *Division de l'Alimentation et de la Nutrition* (DAN)
Maimouna Diop Ly, DAN
Abdoulaye Sambe, DAN
Omar Ba, Responsible for logistics, Expanded Program for Immunization (Programme EPI)
Sylla Al Hassan, Chief, Division Statistics, *Direction des études de la recherche et de la formation* (DERF)
Mamadou Ngom, *Direction de la Pharmacie et du Médicament* (DPM)
Ndèye Fatou Ndiaye Diaw, *Pharmacie Nationale d'Approvisionnement*
Diagne Aichatou Diop, Technicien Supérieure de santé, *Direction de Soins de Santé Primaire*
Hadiatou Barry, BASICS II
Hassan Yaradou, BASICS II
Antoine Ndiaye, MSH
Ndiouga Diallo, DMCI Coordinator

## DMCI Data Collector Trainers

Mamadou Ngom, DPM
Hadiatou Barry, BASICS II
Abdoulaye Sambe, DAN
Ndiouga Diallo, DMCI Coordinator

## DMCI Data Collectors

### *Team Guediawaye, Dakar Region*

Francoise Carvallho, Supervisor, Primary Health Care (PHC), *Région Médicale*, Dakar
Nancy Seck, Pharmacist, *Pharmacie Régionale d'Approvisionnement*, Kaolack
Abdoukahdre Ndiaye, Hygienist, Louga
Sokhane Touré, Social and Community Agent, Dakar
Papa Mbaye, Social and Community Agent, Dakar

### *Team Kaffrine, Kaolack Region*

Gallo Sow, Pharmacist, Institute of Social Hygiene, Dakar
Amadou Gueye, Regional Supervisor, Thies
Mamadou Diouf, Social Nutrition Assistant, DAN
Mor Ndiaye, Social and Community Agent, Dakar

### *Team Sokone, Fatick Region*

Ngor Ndiaye, Director of Training Center, Kaolack
Mbaye Diop, Pharmacist, Dakar
El Hadji Thoye, Regional Supervisor of Nutrition, Fatick Region
Moustapha Ndour, Social and Community Agent, Dakar

### *Team Thies, Thies Region*

Mamadou Ndoye, Regional Supervisor of PHC, Fatick Region
Rokhaya Ndiaye, Pharmacist, DPM, Dakar
Mambaye Fall, District Supervisor, Thies
Daya Diallo, Social Assistant, Dakar
Awa Seck, Sociologist, Dakar

### *Team Kebemer, Louga Region*

Khady Seye, Pharmacist of Regional Hospital, Kaolack
Aissatou Diedhou, Supervisor, Dakar
Bineta Bicoum, Health Educator, Louga
Yaba Touré, Social and Community Agent, Dakar

### *Team Ziguinchor, Ziguinchor Region*

Bousso Thiam, Regional Pharmacist, Ziguinchor
Mamadou Lo, Social and Community Agent, Dakar
Abdou Sene, Regional Supervisor PHC, Ziguinchor
Leonard Coly, Nutritionist, DAN, Dakar

### DMCI Survey Coordinators

Ndiouga Diallo, Pharmacist, DMCI Local Coordinator
Jane Briggs, MSH/RPM Plus
Michael Gabra, MSH/RPM Plus
Paul Ickx, BASICS II

# ANNEX 3. TRACER DRUGS AND SUPPLIES

## Senegal IMCI Tracer List of Drugs, Vaccines, and Medical Supplies

| | |
|---|---|
| 1 | Amoxicillin 250mg/5ml syrup |
| 2 | Amoxicillin 500mg tablet |
| 3 | Asprin 500mg tablet |
| 4 | Balance |
| 5 | Chloramphenicol 1g/vial |
| 6 | Chloroquine 50mg/5ml syrup |
| 7 | Chloroquine 150mg tablet |
| 8 | Co-trimoxazole 240mg/5ml |
| 9 | Co-trimoxazole 480mg tablet |
| 10 | Diazepam injection 5mg/ml |
| 11 | Ferrous/folate syrup 200/0.25mg/ml |
| 12 | Ferrous sulfate/folic acid 200/0.25mg tablet |
| 13 | Gentian violet paint, 25 grams |
| 14 | Hydrocortisone injection 20mg/ml |
| 15 | IV-giving set |
| 16 | Mebendazole 100mg tablet |
| 17 | Metronidazole 250mg tablet |
| 18 | Metronidazole 250mg/5ml syrup |
| 19 | Nalidixic acid 500mg tablet |
| 20 | Oral rehydration salts |
| 21 | Paracetamol 120mg/5ml syrup |
| 22 | Paracetamol 500mg tablet |
| 23 | Quinine 100mg/ml injection |
| 24 | Salbutamol 0.5mg/ml injection |
| 25 | Sodium chloride 500ml |
| 26 | Syringes + needle |
| 27 | Tetracycline 250mg tablet |
| 28 | Tetracycline eye ointment 1% |
| 29 | Thermometer pack/piece |
| 30 | Vaccine BCG 10 dose/amp |
| 31 | Vaccine DPT 20 dose/amp |
| 32 | Vaccine measles 20 dose/amp |
| 33 | Vaccine polio |
| 34 | Vitamin A 100,000IU tablet |

# ANNEX 4. LIST OF CLASSIFICATION

The following diagnostic terms were considered to be acceptable for the four diseases under study in the DMCI assessment. The symptoms are in French as they were used in the local context.

## Diarrhea

- Diarrhée
- Selles liquides
- Selles fréquentes

## Pneumonia

- Toux, et dyspnée (respiration sifflante ou difficile ou rapide) +/– fièvre
- Toux et dépression cage thoracique
- Pneumonie
- Broncho-pneumonie
- Pneumopathie
- Infection pulmonaire
- Broncho-pneumopathie

## No Pneumonia

- Toux
- Rhinopharyngites
- Grippe
- Douleurs gorge
- Rhinorrhée
- Rhinite
- Ecoulement clair
- Etat grippal
- Syndrome grippal
- Nez qui coule
- Rhume
- Pharyngites

## Malaria

- Fièvre/corps chaud
- Frisson/fièvre
- Accès Palustre
- Paludisme
- Syndrome Palustre
- Vomissement et fièvre
- Fièvre/Céphalée
- Etat fébrile
- Malaria

# ANNEX 5. TRAINING SCHEDULE

## Day 1 Thursday 20 September 2001

| | |
|---|---|
| 08.30–09.00 | Session 00 Activity 2: Administrative issues |
| 09.00–10.00 | Session 00 Activity 1: Welcome and opening |
| 10.00–10.15 | Coffee break |
| 10.15–11.10 | Session 00 Activity 3: Introduction of participants |
| 11.10–11.30 | Session 00 Activity 4: Rules of the classroom |
| 11.30–12.00 | Session 01 Activity 1: Context of the study |
| 12.00–12.30 | Session 01 Activity 2: The DMCI tool<br>Step a: Goal and objectives of the tool |
| 12.30–12.45 | Session 01 Activity 2: The DMCI tool<br>Step b: Drug availability and drug use studies |
| 12.45–13.15 | Session 01 Activity 2: The DMCI tool<br>Step c: Tracer Drugs |
| 13.30–14.30 | Lunch |
| 14.30–15.30 | Session 01 Activity 2: The DMCI tool<br>Step d: Indicators |
| 15.30–15.50 | Session 01 Activity 2: The DMCI tool<br>Step e: Teams of data collectors |
| 15.50–16.05 | Coffee break |
| 16.05–16.15 | Summary |
| 16.15– | Start session 2 |

## Day 2 Friday 21 September 2001

| | |
|---|---|
| 08.30–09.00 | Review of previous day |
| 09.00–09.20 | Session 02 Activity 1: The data collection process<br>Step a: Collection sites |
| 09.20–09.50 | Session 02 Activity 1: The data collection process<br>Step b: Organization of data collection |
| 09.50–10.50 | Session 02 Activity 1: The data collection process<br>Steps c & d: Presenting yourselves in health facilities |
| 10.50–11.05 | Coffee break |
| 11.05–11.20 | Session 03 Drug availability study (DAS)<br>Activity 1: Review of data collection sites |
| 11.20–11.30 | Session 03 DAS Activity 2: Review of data collection forms<br>Step a: DAS form 1 |
| 11.30–13.00 | Session 03 DAS Activity 2: Review of data collection forms<br>Steps b, c & d: DAS 2 explanation & practical |
| 13.00–13.30 | Session 03 DAS Activity 2: Review of data collection forms<br>Step e: DAS 3 explanation |
| 13.30–14.30 | Lunch |

14.30–15.30 Session 03 DAS Activity 2: Review of data collection forms
Steps f & g: DAS 3 practical
15.30–15.45 Session 03 DAS Activity 2: Review of data collection forms
Step h: DAS 4 explanation
15.45–16.00 Coffee break
16.00–18.30 Session 04 Drug use Study (DUS) Activity 1: Review of data collection forms
Steps a, b, c & d: DUS 1

### Day 3 Saturday 22 September 2001

08.30–09.00 Review of previous day
09.00–09.45 Session 04 DUS Activity 2: DUS 2 observation
09.45–11.45 Session 04 DUS Activity 3: Exercise DUS 2 observation
11.45–13.45 Session 04 DUS Activities 4 & 5: DUS 3 exit interview
13.45–14.45 Lunch
14.45–17.45 Session 04 DUS Activities 6 & 7: DUS 4 simulated client
17.45–18.30 Session 04 DUS Activity 8: Summary of problems encountered

### Day 4 Monday 24 September 2001

08.30–09.00 Instructions for the practical session in *centres de santé*
09.00–17.00 Day of practical session
19.00–21.30 Team Leaders meeting

### Day 5 Tuesday 25 September 2001

08.30–10.30 Session 06: Exchange experiences
10.30–10.45 Coffee break
10.45–11.15 Session 07 Activity1: Finalize list of acceptable terms for prescription analysis
11.15–12.15 Session 07 Activity 2: Team formation for the survey
12.15–13.15 Session 07 Activity 3: Schedule of data collection at each site
13.15–14.15 Lunch
14.15–15.15 Session 07 Activity 4: Administrative aspects

# ANNEX 6. RESULTS OF THE INDICATORS IN SENEGAL

## Drug Availability Study

| Indicator | Overall Result | PNA | PRA | District Depot | Centre de Santé | | | Poste de Santé | | | Case de Santé | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | *All* | *IMCI* | *Non-IMCI* | *All* | *IMCI* | *Non-IMCI* | *All* | *IMCI* | *Non-IMCI* |
| Indicator 1. Percentage of DMCI tracer drug products on the Essential Drugs List | **94%** | | | | | | | | | | | | |
| Indicator 2. Percentage of median international price paid for a set of DMCI tracer drugs that were part of the last regular MoH procurement | **90%** | | | | | | | | | | | | |
| Indicator 3. Average percentage of a set of unexpired DMCI tracer drugs available in MoH storage and health facilities | **49%** | 91% (n=1) | 62%[a] (n=3) | 70% (n=6) | **59% (n=6)** | 63% (n=2) | 59% (n=4) | **58% (n=18)** | 60% (n=3) | 58% (n=15) | **24%[b] (n=17)** | 22% (n=8) | 24% (n=9) |
| Indicator 4. Average percentage of time out-of-stock for a set of DMCI tracer drugs in MoH storage and health facilities | **43%** | 17% (n=1) | 21% (n=3) | 19% (n=6) | **36% (n=6)** | 27% (n=2) | 41% (n=4) | **34% (n=18)** | 32% (n=3) | 35% (n=15) | **70%[c] (n=17)** | 76% (n=8) | 62% (n=9) |
| Indicator 5. Average percentage of stock records that correspond with physical counts for a set of DMCI tracer drugs in MoH storage and health facilities | **62%** | 94% (n=1) | 50% (n=3) | 45% (n=6) | **42% (n=6)** | 38% (n=2) | 43% (n=4) | **58% (n=18)** | 49% (n=3) | 63% (n=15) | **80%[d] (n=17)** | 82% (n=8) | 78% (n=9) |

[a] This indicator becomes 70 percent if vaccines are not included in the calculation.
[b] This value is for all 34 tracer drugs. If recalculated for the 9 drugs intended to be used at CaS level, the result is 58 percent.
[c] This value is for all 34 tracer drugs. If recalculated for the 9 drugs, the result is 34 percent.
[d] If this value is recalculated for only the 9 drugs, the result is 53 percent.

## Drug Availability Study continued

| Indicator | Overall Result | PNA | PRA | District Depot | Centre de Santé | | | Poste de Santé | | | Case de Santé | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | *All* | *IMCI* | *Non-IMCI* | *All* | *IMCI* | *Non-IMCI* | *All* | *IMCI* | *Non-IMCI* |
| Indicator 6. Percentage of MoH storage and health facilities visited that have a working refrigerator with freezing compartment and thermometer for vaccine storage | **45%** | 100% (n=1) | N/A | 83% (n=6) | **50% (n=6)** | (n=2) | (n=4) | **28% (n=18)** | | | N/A | | |
| Indicator 7. Percentage of MoH storage and health facilities with working refrigerator and up-to-date monitoring records for temperature | **64%** | 100% (n=1) | N/A | 60% (n=5) | **33% (n=3)** | | | **80% (n=5)** | | | N/A | | |

*Note :* N/A = not applicable

## Drug Use Study

| Indicator | Overall Result | Centre de Santé | | | Poste de Santé | | | Case de Santé | | | Private |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *All* | *IMCI* | *Non-IMCI* | *All* | *IMCI* | *Non-IMCI* | *All* | *IMCI* | *Non-IMCI* | |
| Indicator 8. Percentage of MoH health facilities visited with an official manual of treatment guidelines for childhood illnesses or WHO IMCI treatment guidelines | **36% STG 18% IMCI** | **60% STG 20% IMCI (n=5)** | 100% IMCI (n=1) | 75% STG (n=4) | **72% STG 39% IMCI (n=18)** | 100% IMCI (n=6) | 75% STG (n=12) | **0% STG 0% IMCI (n=17)** | 0% IMCI (n=9) | 0% STG (n=8) | |
| Indicator 9. Percentage of encounters diagnosed as no pneumonia (cough or cold) that are prescribed antibiotics | **69%** | **69% (n=162)** | 21% (n=48) | 89% (n=114) | **66% (n=502)** | 34% (n=127) | 77% (n=375) | **92% (n=51)** | 0 (n=4) | 100% (n=47) | 26% (n=27) |
| Indicator 10. Percentage of encounters diagnosed as pneumonia that are prescribed appropriate antibiotics according to treatment guidelines | **86%** | **86% (n=134)** | 92% (n=51) | 88% (n=83) | **86% (n=188)** | 98% (n=127) | 89% (n=61) | **0 (n=0)** | | | 0 (n=0) |
| Indicator 11. Percentage of encounters diagnosed as diarrhea that are prescribed ORS | **60%** | **49% (n=176)** | 100% (n=42) | 34% (n=134) | **65% (n=476)** | 62% (n=128) | 66% (n=348) | **54% (n=127)** | 91% (n=11) | 51% (n=116) | 0% (n=27) |
| Indicator 12. Percentage of encounters diagnosed as diarrhea that are prescribed antidiarrheals | **7%** | **11% (n=176)** | 0% (n=42) | 14% (n=134) | **4% (n=476)** | 0% (n=128) | 5% (n=348) | **17% (n=127)** | 0% (n=11) | 18% (n=116) | 37% (n=27) |
| Indicator 13. Percentage of encounters diagnosed as nondysentery/noncholera diarrhea that are prescribed antibiotics | **64%** | **83% (n=176)** | 76% (n=42) | 85% (n=134) | **64% (n=476)** | 63% (n=128) | 63% (n=348) | **39% (n=127)** | 36% (n=11) | 39% (n=116) | 26% (n=27) |
| Indicator 14. Percentage of encounters diagnosed as malaria that are prescribed an appropriate oral antimalarial, according to treatment guidelines | **76%** | **77% (n=235)** | 97% (n=67) | 68% (n=168) | **78% (n=721)** | 96% (n=212) | 70% (n=509) | **72% (n=261)** | 88% (n=16) | 71% (n=245) | 57% (n=28) |
| Indicator 15. Average cost of drugs prescribed as a percentage of costs if IMCI norms for treatment were followed | **306%** | **462% (n=707)** | 179% (n=208) | 579% (n=499) | **276% (n=1887)** | 159% (n=594) | 329% (n=1293) | **188% (n=439)** | 118% (n=31) | 193% (n=408) | 474% (n=82) |

## Drug Use Study continued

| Indicator | Overall Result | Centre de Santé | | | Poste de Santé | | | Case de Santé | | | Private[a] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *All* | *IMCI* | *Non-IMCI* | *All* | *IMCI* | *Non-IMCI* | *All* | *IMCI* | *Non-IMCI* | |
| Indicator 16. Percentage of prescribed drugs actually dispensed | **68%** | **53% (n=257)** | 63% (n=79) | 49% (n=178) | **72% (n=780)** | 81% (n=309) | 66% (n=471) | **90% (n=29)** | 86% (n=21) | 100% (n=8) | N/A |
| Indicator 17. Percentage of caregivers who could correctly describe how to give the prescribed medication | **59%** | **40% (n=70)** | 63% (n=27) | 25% (n=43) | **64% (n=210)** | 69% (n=87) | 62% (n=123) | **88% (n=8)** | 83% (n=6) | 100% (n=2) | N/A |
| Indicator 18. Percentage of encounters where health workers asked one or more clinical questions from IMCI guidelines to determine severity of health problem | **56%** | **46% (n=71)** | 67% (n=27) | 34% (n=44) | **61% (n=217)** | 99% (n=87) | 35% (n=130) | **13% (n=8)** | 0 (n=6) | 50% (n=2) | 21% (n=82) |
| Indicator 19. Percentage of health workers who provided basic information to caregivers on how to give the recommended drugs | **86%** | **76% (n=71)** | 89% (n=27) | 68% (n=44) | **88% (n=217)** | 98% (n=87) | 82% (n=130) | **100% (n=8)** | 100% (n=6) | 100% (n=2) | 32% (n=82) |
| Indicator 20. Percentage of health workers who told caregivers about any signs of progressive illness and recommended a visit to the doctor or clinic if the signs appear | **43%** | **38% (n=71)** | 48% (n=27) | 32% (n=144) | **44% (n=217)** | 63% (n=87) | 31% (n=130) | **63% (n=8)** | 50% (n=6) | 100% (n=2) | 0% (n=82) |
| Indicator 23. Percentage of cases that received nutritional advice | **41%** | **41% (n=71)** | 70% (n=27) | 23% (n=44) | **41% (n=217)** | 78% (n=87) | 17% (n=130) | **25% (n=8)** | 33% (n=6) | 0% (n=2) | 0% (n=82) |
| Indicator 24. Percentage of caregivers receiving antibiotics who could correctly describe how to administer the medication | **37%** | **31% (n=51)** | 57% (n=14) | 22% (n=37) | **40% (n=137)** | 36% (n=59) | 44% (n=78) | **20% (n=5)** | 0% (n=4) | 100% (n=1) | N/A |

[a] N/A = Not applicable

# ANNEX 7. ESSENTIAL DRUGS LIST TIERED BY FACILITY

## Centre de Santé Level

### *I. Anti-infectious Agents*

| | | |
|---|---|---|
| Amoxicillin | 500 mg<br>250 mg | Tablet or capsule<br>Syrup |
| Ampicillin | 1g | Injection |
| Benzathine-benzylpenicillin | 2,400,000 IU<br>1,200,000 IU<br>600,000 IU | Injection<br>Injection<br>Injection |
| Benzylpenicillin | 1.000.000 IU | Injection |
| Benzylpenicillin + procaine | 1.000.000 IU | Injection |
| Phenoxymethylpenicillin | 250 mg | Tablet or capsule |
| Sulfamethoxazole +<br>trimethoprim | 400 mg + 80 mg<br>200 mg + 40 mg | Tablet<br>Syrup |
| Tetracyline | 250 mg | Tablet or capsule |
| Doxycycline | 100 mg | Tablet or capsule |
| Erythromycin | 500 mg | Tablet or capsule |
| Chloramphenicol | 1g<br>250 mg | Injection<br>Tablet or capsule |
| Gentamicin | 10 mg<br>40 mg<br>80 mg | Injection<br>Injection<br>Injection |
| Ciprofloxacin | 250 mg | Tablet or capsule |
| Ethambutol | TB Program | |
| Isoniazid | TB Program | |
| Pyrazinamide | TB Program | |
| Rifampicin | TB Program | |
| Streptomycin 1g | TB Program | |
| Thiocetazone + I.N.H. | TB Program | |
| Clofazimine | Leprosy Program | |
| Disulone | Leprosy Program | |
| Rifampicin | Leprosy Program | |
| Amodiaquine | 200 mg | Tablet or capsule |
| Chloroquine | 100 mg<br>10 mg/ml | Tablet<br>Syrup |
| Quinine base | 300 mg/2 ml | Injection |
| | 600 mg/2ml | Injection |
| Quinine-resorcine | 100 mg/ml | Injection |
| Metronidazole | 500 mg<br>500 mg<br>200 mg/5ml | Tablet<br>Pessary<br>Suspension |
| Griseofulvin | 250 mg | Tablet or capsule |
| Nystatin | 500,000 IU<br>100,000 IU<br>100,000 IU | Tablet or capsule<br>Pessary<br>Suspension |
| Mebendazole | 100 mg<br>100 mg/5ml | Tablet<br>Suspension |
| Niclosamide | 500 mg | Tablet or capsule |

| | | |
|---|---|---|
| Tiabendazole | 500 mg<br>50 mg/5ml | Tablet or capsule<br>Suspension |
| Ivermectin | 6 mg | Tablet or capsule |
| Praziquantel | 600 mg | Tablet or capsule |

## *II. Anesthetics*

| | | |
|---|---|---|
| Oxygen | | |
| Nitrous oxide | | |
| Ketamine | 50 mg/amp | Injection |
| Thiopentone | 1g | Injection |
| Lidocaine | 2% | Injection |
| Atropine | 0.25 mg | Injection |
| Diazepam | 10 mg/2ml | Injection |
| Gallamine | 40 mg/ml | Injection |

## *III. Analgesics, Antipyretics, Anti-inflammatories*

| | | |
|---|---|---|
| Lysine Acetylsalicylate | 1.8 g | Injection |
| Acetylsalicylic acid | 500 mg | Tablet |
| Paracetamol | 500 mg<br>125 mg/5ml | Tablet or capsule<br>Syrup |
| Indomethacin | 25 mg | Tablet or capsule |
| Mefenamic acid | 250 mg | Tablet or capsule |
| Pethidine | 50 mg/ml | Injection |

## *IV. Antiallergics and Drugs Used to Treat Anaphylaxis*

| | | |
|---|---|---|
| Hydrocortisone | 100 mg | Injection |
| Dexamethasone | 4 mg | Injection |
| Promethazine | 50 mg<br>25 mg | Injection<br>Tablet or capsule |

## *V. Antidotes*

| | | |
|---|---|---|
| Carbon | 500 mg | Tablet |
| Pralidoxime | 200 mg | Injection |

## *VI. Psychotropics*

| | | |
|---|---|---|
| Diazepam | 10 mg/2ml<br>5 mg | Injection<br>Tablet |
| Phenobarbitone | 100 mg<br>40 mg | Tablet<br>Injection |
| Chlorpromazine | 100 mg<br>25 mg/5ml | Tablet<br>Injection |

## *VII. Drugs Acting on the Blood*

| | | |
|---|---|---|
| Iron and folic acid | 200 mg + 0.25 mg | Tablet |
| Iron | 200 mg | Tablet or capsule |
| Folic acid | 5 mg | Tablet or capsule |
| Ethamsylate | 500 mg<br>250 mg | Tablet or capsule<br>Injection |
| Methylergometrine | 0.25 mg | Drops |
| Phytomenadione | 50 mg | Injection |

## *VIII. Blood Substitutes*

| | | |
|---|---|---|
| Modified gelatin fluid | | Injection perfusion |

## *IX. Drugs for the Cardiovascular System*

| | | |
|---|---|---|
| Furosemide | 40 mg<br>20 mg | Tablet<br>Injection |
| Nicardipine | 5 mg/5 ml | Injection |
| Methyldopa | 250 mg | Tablet |
| Hydrochlorothiazide | 25 mg | Tablet |
| Nifedipine | 10 mg | Tablet |
| Digoxin | 0.25 mg<br>0.25 mg | Tablet<br>Injection |
| Hydrocortisone | 100 mg | Injection |
| Epinephrine | 0.25 mg/ml | Injection |
| Sodium chloride | 9% | Injection |

## *X. Dermatological Drugs*

| | | |
|---|---|---|
| Griseofulvine | 5g | Ointment |
| Chlortetracycline (or tetracycline) | 3% | Ointment |
| Sodium hypochlorite | 8% | Solution |
| Eosine aqueous | 2% | Solution |
| Alcohol | 70% | Liquid |
| Iodine in alcohol | | Solution |
| Potassium permanganate | 500 mg | Tablet |
| Polyvidone iodine | 10% | Solution |
| Oxygenated water | 30V | |
| Dakin | | Solution |
| Impregnated compresses | | |
| Ether | | |
| Gentian violet | 250 mg | Tub of powder |
| Benzyl benzoate | 12.5% | Solution |
| Lindane | 400 mg | Powder |
| Salicylic vaseline | 5%<br>10% | Ointment<br>Ointment |

## XI. Oxytocics and Antioxytocics

| | | |
|---|---|---|
| Oxytocin | 5 IU | Injection |
| Salbutamol | 0.5 mg<br>2 mg | Injection<br>Tablet |

## XII. Drugs of the Digestive Tract

| | | |
|---|---|---|
| Aluminium and magnesium salts | 400 mg | Tablet |
| Cimetidine | 400 mg | Tablet or capsule |
| Metoclopramide | 10 mg/2ml<br>10 mg<br>260 mg/100 ml | Injection<br>Tablet<br>Drops |
| Hydrocortisone | 1% | Ointment |
| Atropine | 0.25 mg | Injection |
| N-Butylhyoscine bromide | 20 mg<br>10 mg | Injection<br>Tablet or capsule |
| Phloroglucinol | 40 mg | Injection |
| Senna | 7.5 mg | Tablet or capsule |
| Paraffin oil | | |
| Oral rehydration salts | Compose | Powder |

## XIII. Drugs for the Respiratory System

| | | |
|---|---|---|
| Carbocysteine | 375 mg<br>100 mg/5 ml | Tablet or capsule<br>Syrup |
| Terpine + codeine | 100 mg + 5 mg | Tablet or capsule |
| Aminophylline | 25 mg/ml | Injection |
| Salbutamol | 0.5 mg<br>2 mg/5 ml | Injection<br>Syrup |

## XIV. Buccodental Drugs

| | | |
|---|---|---|
| Hexetidine | 0.1% | Solution |
| Alvogyl | | |
| Lidocaine & adrenaline | 2% | Injection |
| Lidocaine | 2% | Cartridge |
| Pharmaethyl | | |
| Pulperyl | | |

## *XV. Immunological Preparations*

| | | |
|---|---|---|
| Antivenom serum | | |
| Antirabies serum | | |
| Tuberculosis vaccine | | |
| Poliomyelitis vaccine | | |
| Diphtheria vaccine | | |
| Whooping cough vaccine | | |
| Tetanus vaccine | | |
| Yellow fever vaccine | | |
| Measles vaccine | | |
| Hepatitis B vaccine | | |
| Meningococcal vaccine | | |
| Rabies vaccine | | |

## *XVI. Correction of Electrolyte and Acid-Base Imbalances*

| | | |
|---|---|---|
| Sodium bicarbonate | 14% | Perf. |
| Sodium chloride | 9%<br>10% | Perf.<br>Ampoule injection |
| Potassium chloride | 10% | Ampoule injection |
| Ringer's lactate | | Perf. |
| Glucose | 5% | Perf. |

## *XVII. Ophthalmic Preparations*

| | | |
|---|---|---|
| Chlortetracycline or tetracycline | 1% | Ointment |
| Silver vitellinate | 1% | Collyre |

## *XVIII. Vitamins and Mineral Salts*

| | | |
|---|---|---|
| Ascorbic acid | 500 mg<br>500 mg | Tablet<br>Injection |
| Retinol | 100,000 IU | Tab or capsule |
| Calcium gluconate | 10% | Injection |
| Pyridoxine | 250 mg/5ml | Injection |

## *XIX. Solvents*

| | | |
|---|---|---|
| Water for injection | | 5 ml ampoule |

## *XX. Insulins and Other Antidiabetics*

| | | |
|---|---|---|
| Glibenclamide | 5 mg | Tablet |
| Insulin soluble | 40 IU | Injection |
| Insulin semi-retard (IPZ) | 40 IU | Injection |

## XXI. Ear, Nose, and Throat

| |
|---|
| Specialist advice |

## XXII. Hormones, Other Hormonal Drugs, and Contraceptives

| | | |
|---|---|---|
| Condoms | | |
| Spermicides | | |
| Implants subcutaneous | | |
| IUD: TCU 380 A | | |
| Ethinylestradiol + levonorgestrel | 0.03 mg + 0.15 mg | Tablet |
| Noresthisterone | 200 mg | Injection |
| Medroxyprogesterone acetate | 150 mg | Injection |
| Norgestrel + ethinylestradiol | 0.50 mg + 0.05 mg | Tablet |
| Hydroxyprogesterone caproate | 500 mg/2 ml | Injection |
| Crésilol | | |
| Deltamethrin | | |
| Chlorpyrimiphos methyl (C.E. and P.P.) | | |
| Elicide | | |

## Poste de Santé Level

### *I. Anti-infectious Agents*

| | | |
|---|---|---|
| Amoxicillin | 500 mg<br>250 mg | Tablet or capsule<br>Syrup |
| Ampicillin | 1g | Injection |
| Benzathine-benzylpenicillin | 2,400,000 IU<br>1,200,000 IU<br>600,000 IU | Injection<br>Injection<br>Injection |
| Benzylpenicillin | 1,000,000 IU | Injection |
| Sulfamethoxazole +<br>trimethoprim | 400 mg + 80 mg<br>200 mg + 40 mg | Tablet<br>Syrup |
| Tetracyline | 250 mg | Tablet or capsule |
| Doxycycline | 100 mg | Tablet or capsule |
| Erythromycin | 500 mg | Tablet or capsule |
| Streptomycin 1g | TB Program | |
| Thiocetazone + I.N.H | TB Program | |
| Clofazimine | Leprosy Program | |
| Disulone | Leprosy Program | |
| Rifampicin | Leprosy Program | |
| Amodiaquine | 200 mg | Tablet or capsule |
| Chloroquine | 100 mg<br>10 mg/ml | Tablet<br>Syrup |
| Quinine base | 300 mg/2 ml | Injection |
| | 600 mg/2 ml | Injection |
| Quinine-resorcine | 100 mg/ml | Injection |
| Metronidazole | 500 mg<br>500 mg<br>200 mg/5 ml | Tablet<br>Pessary<br>Suspension |
| Griseofulvin | 250 mg | Tablet or capsule |
| Nystatin | 500,000 IU<br>100,000 IU<br>100,000 IU | Tablet or capsule<br>Pessary<br>Suspension |
| Mebendazole | 100 mg<br>100 mg/5 ml | Tablet<br>Suspension |
| Niclosamide | 500 mg | Tablet or capsule |
| Ivermectin | 6 mg | Tablet or capsule |
| Praziquantel | 600 mg | Tablet or capsule |

### *II. Anesthetics*

| | | |
|---|---|---|
| Lidocaine | 2% | Injection |

### *III. Analgesics, Antipyretics, Anti-inflammatories*

| | | |
|---|---|---|
| Acetylsalicylic acid | 500 mg | Tablet |
| Paracetamol | 500 mg<br>125 mg/5 ml | Tablet or capsule<br>Syrup |

## IV. Antiallergics and Drugs Used to Treat Anaphylaxis

| | | |
|---|---|---|
| Promethazine | 50 mg<br>25 mg | Injection<br>Tablet or capsule |

## V. Antidotes

| | | |
|---|---|---|
| Carbon | 500 mg | Tablet |

## VI. Psychotropics

| | | |
|---|---|---|
| Diazepam | 10 mg/2 ml<br>5 mg | Injection<br>Tablet |
| Phenobarbitone | 100 mg<br>40 mg | Tablet<br>Injection |

## VII. Drugs Acting on the Blood

| | | |
|---|---|---|
| Iron and folic acid | 200 mg + 0.25 mg | Tablet |
| Iron | 200 mg | Tablet or capsule |
| Folic acid | 5 mg | Tablet or capsule |
| Ethamsylate | 500 mg<br>250 mg | Tablet or capsule<br>Injection |
| Methylergometrine | 0.25 mg | Drops |

## VIII. Drugs for the Cardiovascular System

| | | |
|---|---|---|
| Furosemide | 40 mg<br>20 mg | Tablet<br>Injection |
| Hydrocortisone | 100 mg | Injection |
| Epinephrine | 0.25 mg/ml | Injection |
| Sodium chloride | 9% | Injection |

## IX. Dermatological Drugs

| | | |
|---|---|---|
| Griseofulvine | 5g | Ointment |
| Chlortetracycline (or tetracycline) | 3% | Ointment |
| Sodium hypochlorite | 8% | Solution |
| Eosine aqueous | 2% | Solution |
| Alcohol | 70% | Liquid |
| Potassium permanganate | 500 mg | Tablet |
| Polyvidone iodine | 10% | Solution |
| Benzyl benzoate | 12.5% | Solution |
| Lindane | 400 mg | Powder |

## *X. Drugs of the Digestive Tract*

| | | |
|---|---|---|
| Aluminium and magnesium salts | 400mg | Tablet |
| Metoclopramide | 10 mg/2 ml<br>10 mg<br>260 mg/100 ml | Injection<br>Tablet<br>Drops |
| Hydrocortisone | 1% | Ointment |
| Atropine | 0.25 mg | Injection |
| N-Butylhyoscine bromide | 20 mg<br>10 mg | Injection<br>Tablet or capsule |
| Senna | 7.5 mg | Tablet or capsule |
| Oral rehydration salts | Compose | Powder |

## *XI. Drugs for the Respiratory System*

| | | |
|---|---|---|
| Carbocysteine | 375 mg<br>100 mg/5 ml | Tablet or capsule<br>Syrup |
| Terpine + codeine | 100 mg + 5 mg | Tablet or capsule |
| Aminophylline | 25 mg/ml | Injection |
| Salbutamol | 0.5 mg<br>2 mg/5 ml | Injection<br>Syrup |

## *XII. Buccodental Drugs*

| | | |
|---|---|---|
| Hexetidine | 0.1% | Solution |

## *XIII. Immunological Preparations*

| |
|---|
| Antivenom serum |
| Tuberculosis vaccine |
| Poliomyelitis vaccine |
| Diphtheria vaccine |
| Whooping cough vaccine |
| Tetanus vaccine |
| Yellow fever vaccine |
| Measles vaccine |
| Hepatitis B vaccine |
| Meningococcal vaccine |

## *XIV. Ophthalmic Preparations*

| | | |
|---|---|---|
| Chlortetracycline or tetracycline | 1% | Ointment |
| Silver vitellinate | 1% | |

## XV. Vitamins and Mineral Salts

| | | |
|---|---|---|
| Ascorbic acid | 500 mg<br>500 mg | Tablet<br>Injection |
| Retinol | 100,000 IU | Tablet or capsule |

## XVI. Solvents

| | | |
|---|---|---|
| Walter for injection | | 5 ml ampoule |

## XVII. Ear, Nose, and Throat

| |
|---|
| Specialist advice |

## XVIII. Hormones, Other Hormonal Drugs, and Contraceptives

| | | |
|---|---|---|
| Condoms | | |
| Spermicides | | |
| Ethinylestradiol + levonorgestrel | 0.03 mg + 0.15 mg | Tablet |
| Medroxyprogesterone acetate | 150 mg | Injection |
| Norgestrel + ethinylestradiol | 0.50 mg + 0.05 mg | Tablet |
| Hydroxyprogesterone caproate | 500 mg/2 ml | Injection |
| Crésilol | | |
| Deltamethrin | | |

## Case de Santé Level

### *I. Anti-infectious Agents*

| | | |
|---|---|---|
| Chloroquine | 100 mg<br>10 mg/ml | Tablet<br>Syrup |
| Mebendazole | 100 mg<br>100 mg/5 ml | Tablet<br>Suspension |

### *II. Analgesics, Antipyretics, Anti-inflammatories*

| | | |
|---|---|---|
| Acetylsalicylic acid | 500 mg | Tablet |

### *III. Antiallergics and Drugs Used to Treat Anaphylaxis*

| | | |
|---|---|---|
| Promethazine | 50 mg<br>25 mg | Injection<br>Tablet or capsule |

### *IV. Drugs Acting on the Blood*

| | | |
|---|---|---|
| Iron and folic acid | 200 mg + 0.25 mg | Tablet |

### *V. Dermatological Drugs*

| | | |
|---|---|---|
| Chlortetracycline (or tetracycline) | 3% | Ointment |
| Sodium hypochlorite | 8% | Solution |
| Eosine aqueous | 2% | solution |
| Benzyl benzoate | 12.5% | Solution |

### *VI. Drugs of the Digestive Tract*

| | | |
|---|---|---|
| Oral rehydration salts | Compose | Powder |

### *VII. Buccodental Drugs*

| | | |
|---|---|---|
| Hexetidine | 0.1% | Solution |

### *VIII. Ophthalmic Preparations*

| | | |
|---|---|---|
| Chlortetracycline or tetracycline | 1% | Ointment |
| Silver vitellinate | 1% | |

## IX. Mechanical Contraceptives

| | | |
|---|---|---|
| Condoms | | |